ADVERTISER'S COPY

**ADVANCED MANUFACTURING ISSUE**

UNIVERSITY MICROFILMS
213 N FIRST ST
ANN ARBOR MICH

ITIONING
ERATION **NEWS**
...er of the Industry

Subscription Price, $6 Per Year | Vol. 79, No. 5, Serial No. 1,437 | October 1, 1956

Issued every Monday at
450 West Fort St., Detroit 26, Michigan
Established 1926

Member, Associated Business Publications — Member, Audit Bureau of Circulations

Reentered as second class matter October 3, 1936 at the post office at Detroit, Mich., under the Act of March 3, 1879. Trade Mark Registered U. S. Patent Office. Copyright 1956, by Business News Publishing Co.

## Inside Dope

By GEORGE F. TAUBENECK

*Learn to live and laugh — thus delay your epitaph*

**Stories of the Week**
**OEM Manufacturers, Please Note**
**Salesmen: Please Note**
**Red-Faced Surveyors**
**Foreign Affairs**
**How To Win the Election**

### *Stories of the Week*

Words of famous men:

Nathan Hale: "I regret I have but one life to give for my country."

Benjamin Franklin: "We must all hang together or we shall all hang separately."

Eli Whitney: "Take your cotton pickin' hands off my gin."

---

Susie Smith (daughter of Lyall Smith, *Detroit Free Press* sports editor) phoned her mother.

"This is me, Mom," she began.

"Susie, you should say, 'It is I,'" corrected Mrs. Smith.

"But Mom, if I say 'It is I' how will you know it's me?"

### *OEM Manufacturers, Please Note*

A new plastic-coated steel sheet for refrigerators, air conditioners, and other appliances will be introduced by the United States Steel Corp. soon.

This new product, to be available in a wide variety of colors and textures, is now in experimental production at U. S. Steel's Irvin Works in Dravosburg, near Pittsburgh. It is made by coating cold-reduced steel sheets with an adhesive, then with liquid vinyl plastic. Heat is applied to solidify the plastic, which can be embossed with a design or texture before cooling.

The sheets can be utilized for many parts which until now have required protective or decorative finishing after fabrication. Furthermore, this new material has "excellent abrasion and good electrical resistance properties and is unaffected by humidity and many chemicals." It also has a sound-deadening effect.

No annual production capacities have been set. This "semi-commercial" product is being offered for sale on a "development basis," with the pilot-line facilities at the Irvin works producing 18 to 28-gauge sheets 24 to 52 in. wide.

### *Salesmen: Please Note*

111 East 56th St.
New York 22, N. Y.

Mr. Inside Dope:

In speeches abroad to com-

*(Concluded on Page 8, Col. 1)*

# *Industry Gears Up with New Designs and Machines To Provide 'Best' In '57 Lines*

AIR CONDITIONING & REFRIGERATION NEWS is the "newspaper" of the industry—but it has always done more than merely present the news. It has brought its readers many special features and special information about some of the many phases of the industry's activities which it covers.

So when some readers started saying to the editors some time ago: "Say, why don't you tell about some of the progress that's taking place in the manufacture of the industry's products," we gave it some thought and said "Why Not?"

But it was decided that it might be best to kind of take an annual look at this particular phase of the business, and publish the material in one issue and call it the "Advanced Manufacturing" issue.

The purpose of the issue is to report how some improvement in the design or engineering of a product, or in the actual manufacturing process, is serving to bring to the field improved products at the lowest possible cost.

This first "Advanced Manufacturing" issue has a wide variety of material which will be of interest to a broad range of the NEWS readership. It is an issue that many readers will want to keep and refer to. For the convenience of readers, following is a list of the principal articles in the sections which offer the "Advanced Manufacturing" information.

Dehydration System on Roof Is Compressor Plant Innovation ..... 4
How Firm Cured Birth Pains of Automated Package Conditioner Factory ..... 10
12-Hour Windy Soaking Tests Water-Tightness of Air Conditioner ..... 13
Interchangeable Components Speed 'Standard' and 'Custom' Lines ..... 14
New Valve Designs Help Speed Production, Hold Costs, and Ease Operation .. 16
All-Plastic Refrigerator Cabinets Can Be Produced Without Molds and Little Tooling ..... 18
Large Inventory of 'Stock' Items Speeds Shipments of Driers, Capillary Tubing ..... 21
Overhead Conveyor Allows Centralized Air Conditioner Crating ..... 22
Cross Transfermatic Equipment Machines 18 Compressor Forgings Per Hr. at 100% Efficiency ..... 23
Motor Standards Maintained with Automatic Test Board, 6-Station Welder, 2-Spindle Honer ..... 24
Die-Cast Components Give Precision Control to Room Unit's Sliding Control .. 25
Organizing Working Area, Materials Allows 1 Man To Handle Entire Blower-Motor Assembly Operation ..... 26
New Facilities, Techniques Aid Production of Zinc-Plated Steel Components .... 27
Blower Wheel To Meet Future Needs Developed ..... 29
Automatic Moisture Detector Allows Speedy Check on Production Line ..... 30
'Dog-Bone' Finned Coil Eliminates Soldered Joints In Single-Row Coil ..... 36
Plant Produces Home Air Conditioning Controls To Satisfy Slight Wiring Differences ..... 38
2 Piston Bores Finished at Same Time by Horizontal Plane Hone ..... 39
Refrigerants, Oxygen, Acetylene Available By Overhead Lines In Air Conditioner Plant ..... 39
Research Laboratory Seen as Key To Air Conditioner Firm's Future ..... 40
Finned Heating Coil Production Time Cut 60% ..... 40
Continuous Conveyor-Fed Porcelain Enamel Oven Ups Quality for Commercial Case Firm ..... 41
Condenser Mfr. Gets Greater Quality Control, Lower Price, More Independence with Own Brass Mill ..... 42
Mechanized Assembly Track, New Processing Operations Speed Room Unit Production ..... 44
Aluminum In Refrigeration Offers Lightness, Strength, and Corrosion Resistance ..... 46
How Room Unit Mfr. Controls Moisture Content By Using Component Control System ..... 48
Production Welding Using Inert-Gas Shielded Arc Highlights Hermetic Unit Production ..... 52
Making Own Sealed Glass Units Gives Commercial Firm Cleaner, Cheaper Glass ..... 54
'Multi-Opener' Simplifies Adding Pre-Weighed Refrigerant Charge ..... 54
Magnesium Die Castings Lighten Motors for Room Air Conditioners ..... 54
Compressor Mfr., Tube Firm Develop Compressor Muffler, Discharge Tube .... 54
'Tri-Tube' Shelves Offer Economy, Better Appearance, Heat Transfer ..... 54
How Cost Reduction Committee Puts Ideas Into Action ..... 56
Some Industry Innovations In 'Human Engineering' ..... 59

## Los Angeles May Control Cooling Units In Furnaces

LOS ANGELES—As a result of meetings with some 20 principal contractors, the Division of Heating & Refrigeration of the City's Department of Building & Safety has drawn up a new regulation to control installation of cooling units in existing furnace warm-air heating systems.

It is expected the new regulation will be adopted at the regular meeting of the Board of Commissioners of Building & Safety on Oct. 1, according to information obtained at the office of A. B. Wicks, chief of the Heating & Refrigeration Div.

Purpose of the regulation is to eliminate the practice of selling a homeowner the idea of summer cooling through his furnace duct system, by using the furnace fan, then installing a low-cost compressor and evaporator cut into the furnace.

Department officials said they often found such installations interfered with the efficiency of the original warm air heating circuit when it came time to have warm air again.

The new regulation will require installation of a larger electric motor, instead of using that on the original furnace fan.

When the board adopts the new regulation, cooling units may be added only when the

*(Concluded on Page 2, Col. 5)*

## *R. K. Miller Heads G-E Home Heating, Cooling*

BLOOMFIELD, N. J.—Robert K. Miller has been appointed general manager of the General Electric Home Heating and Cooling Department in Tyler, Texas according to R. H. Jones, general manager of the General Electric Air Conditioning Div. here.

R. K. Miller

Miller assumes his duties at the Department's new headquarters in Tyler where the company has recently completed a $15 million plant for the manufacture of home cooling units. Limited operations are in progress at this plant.

Prior to his appointment, Miller was manager of manufacturing for the Vacuum Cleaner Department, Cleveland, Ohio. He joined General Electric in 1947.

## B-W Air Brake Obtains Servel Compressor Div.

### *Morrill To Head Div.; To Make ¼ to 7½ Hp. Motor-Compressors*

ELYRIA, Ohio — Bendix-Westinghouse Automotive Air Brake Co. has arranged to purchase Servel, Inc.'s assets and facilities for the manufacture of refrigeration compressors, it was announced here recently.

These facilities will be operated by Bendix-Westinghouse in two former Servel buildings at Evansville, Ind. for the production of electric motor-compressors of ¼ to 7½ hp. for use by air conditioning and refrigeration manufacturers.

John R. Morrill will be appointed general manager of the Bendix - Westinghouse Evansville division. He is vice president of Servel, Inc. and general manager of its commercial refrigeration division.

J. R. Morrill

Included in the purchase are 12.27 acres of land and buildings, machinery and equipment, inventories, patents, trademarks, and technical information used in the production of these products. The price was not revealed.

Commenting on his company's plans, D. O. Thomas, president of Bendix-Westinghouse, said, "The refrigeration compressor industry has experienced outstanding growth in the past 10 years, and there is every indication that further growth is in prospect for strong companies in this field in the next 10 years.

*(Concluded on Page 2, Col. 4)*

## *Rheem Shows Jet Gas Fired Home System*

CHICAGO—An operating prototype of a new gas-fired residential cooling and heating unit employing the jet principle was shown to the press last week in a special demonstration here by Rheem Mfg. Co.

Earlier this year, AIR CONDITIONING & REFRIGERATION NEWS carried a story stating that Rheem had developed such a unit.

In explaining the jet operation through which cooling is accomplished, Rheem said, in part:

"A very small jet discharges

*(Concluded on Back Page, Col. 1)*

WHEN **QUALITY** COUNTS . . .

Count on

**READING**

**Copper Tubing**

FOR REFRIGERATION AND AIR CONDITIONING EQUIPMENT...

READING COPPER TUBE

**READING** TUBE CORPORATION

EMPIRE STATE BUILDING. NEW YORK 1, N. Y.

WORKS: READING, PA.

## Servel--

*(Concluded from Page 1, Col. 5)*

In making the announcement, Duncan C. Menzies, president of Servel, Inc., stated that Servel would use the additional working capital for its program of greater concentration on the manufacture and merchandising of gas refrigerators, "all-year" gas air conditioners, and automatic ice-makers.

Bendix-Westinghouse will sell its products to other manufacturers, and through refrigeration supplies wholesalers and will not make consumer products, the announcement stated.

Bendix-Westinghouse, manufacturing compressors for the automotive industry, has recently expanded into refrigeration and air conditioning component fields.

"Residential and commercial air conditioning markets are broadening constantly. The use of frozen foods is increasing and there are many new developments in cold drink and food dispensing which suggest that well engineered compressors—which are the heart of the refrigeration system—will be in increasing demand.

"A year ago we announced our plans to diversify and manufacture a line of refrigeration compressors. During this past year we have developed a line of air conditioning compressors which will complement the products previously manufactured at Servel."

This line of compressors developed by Bendix-Westinghouse includes 2, 3, and 5-ton full hermetics, according to Dexter S. Kimball, Bendix-Westinghouse vice president. The 5-ton unit is a high-speed compressor.

"We can produce these in limited quantity before the end of the year," Kimball stated.

Bendix-Westinghouse has also developed a line of open-type refrigeration compressors for the automotive air conditioning field, it was stated.

Bendix-Westinghouse is a joint subsidiary of Bendix Aviation Corp. and of Westinghouse Air Brake Co. It has no connection with the Bendix Home Appliance Div. of Avco Mfg. Co. or with Westinghouse Electric Corp.

## Los Angeles--

*(Concluded from Page 1, Col. 4)*

furnace meets certain requirements of a recognized testing agency approved by the board. The testing agency in this case will be the American Gas Association.

The bulletin sent out "proposed regulations to become effective on Oct. 1, 1956, applicable to the addition of a refrigerant evaporator or cooling coil to a warm air heating system," and stated the Board of Building & Safety Commissioners will consider adoption of the following regulations on Oct. 1, 1956:

"No direct fired heat exchanger shall be located downstream from any refrigerant evaporator or other air-cooling coil.

"No refrigerant evaporator or cooling coil shall be located in the air discharge duct of any warm air furnace unless such furnace is approved for operation at 0.5 water column pressure at the warm air discharge outlet of the furnace. Every such approval shall be by a recognized testing agency approved by the board.

"Exception: the foregoing provisions shall not apply to combination air heating and cooling units which comply with the requirements of Section 95.500 (b) of the code."

Section 95.500 (b) of the Los Angeles Heating Code reads as follows:

"Each heat-producing appliance and accessory shall be of a type approved by the board for safe use or comply with applicable nationally recognized standards as determined by a testing agency approved by the board.

"Each heat producing appliance and accessory using gas as a fuel shall be of a type approved by the board for safe use or comply with standards of the American Standards Association."

Announcing...

**Extra-Large**

**CAPACITY**

**THERMOBANK**

**for FREON and AMMONIA**

NOW...no job is too large for the KRAMER THERMOBANK

The only completely automatic system for freezing temperatures offering these extra large capacities. THERMOBANK requires no manual attention whatsoever.

Ceiling mounted, THERMOBANK takes no precious floor space. You can store products directly under the unit.

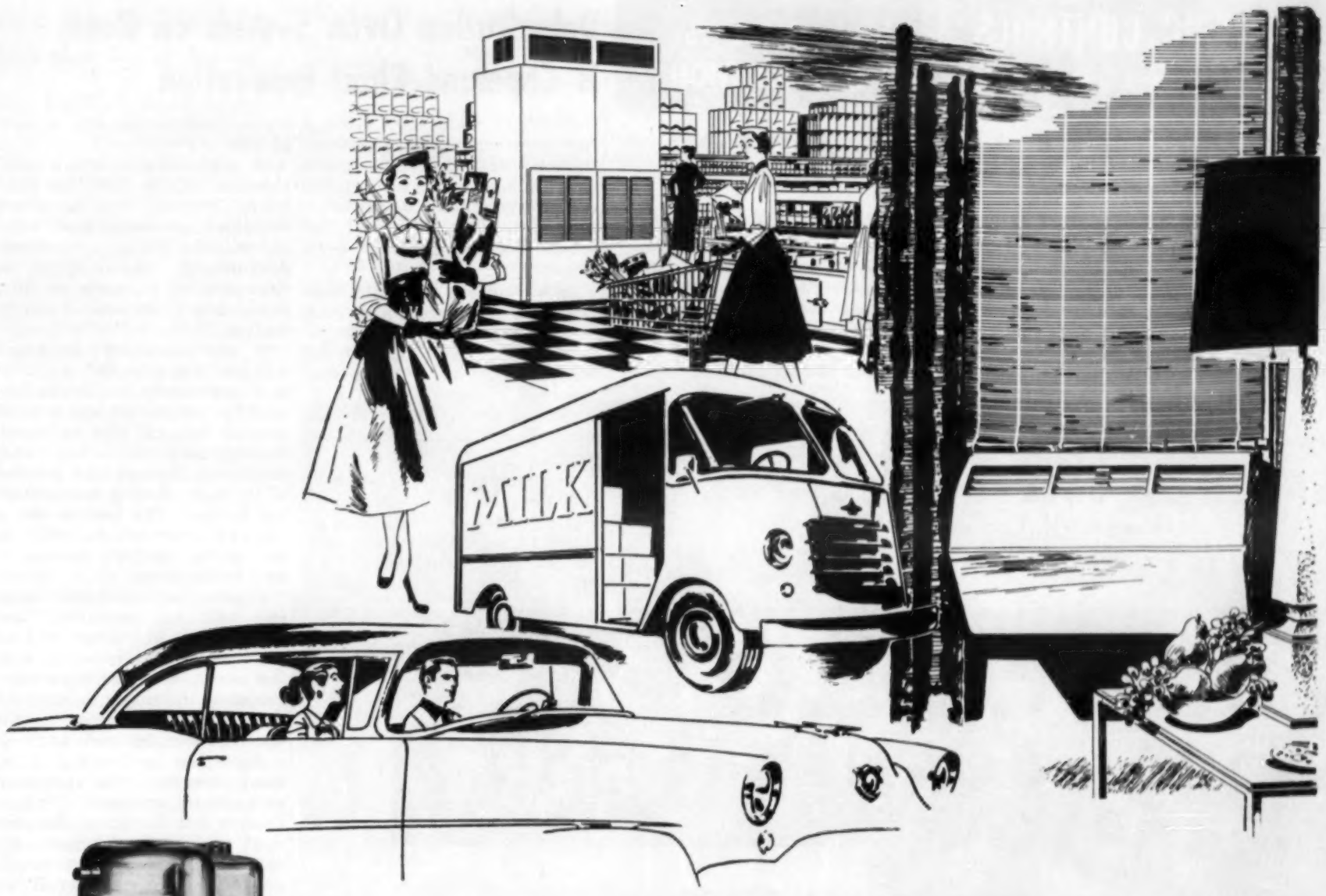
Can be used as an independent system or with an existing large system without affecting the operation of other evaporators.

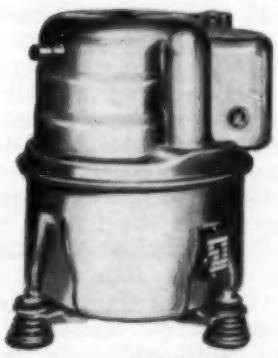
WRITE FOR BULLETIN 294-6

KRAMER TRENTON CO. • Trenton 5, N.J.

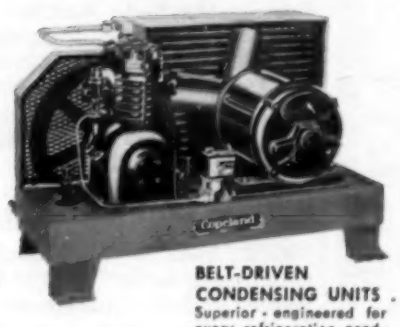


*For more information about products advertised on this page use Information Center, page 34.*



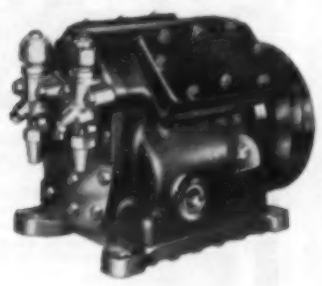



**COPELAWELD**
Heavy duty performance at low current consumption.



**BELT-DRIVEN CONDENSING UNITS . . .**
Superior - engineered for every refrigeration need.

**COPELAMETIC**
the accessible hermetic . . . The industry leader for rugged dependability.



**AUTOMOTIVE AND TRUCK COMPRESSORS . . .**
Designed for the critical needs of truck and auto air conditioning and refrigeration.

# The Heart of America's finest Air Conditioning and Commercial Refrigeration

OVER 500 manufacturers of quality display cases, coolers and air conditioners as well as truck fleet operators and automobile makers now use Copeland compressors and condensing units original and replacement equipment. The hundreds of thousands of units now in operation are evidence of Copeland's ruggedness, economy and dependability . . . and good reason why industry turns to Copeland for the advanced design and engineering necessary to an expanding air conditioning and refrigeration market.

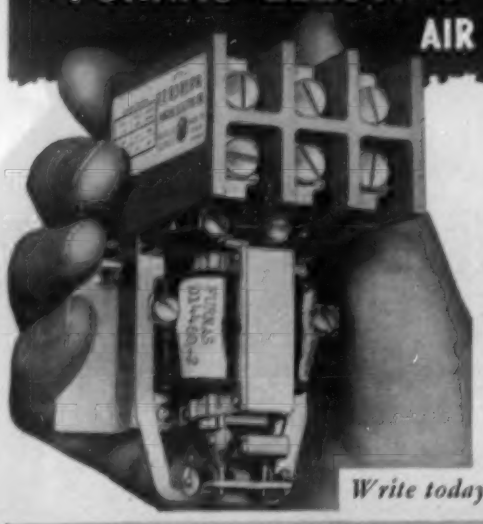
WRITE FOR SPECIFICATION AND PERFORMANCE DATA

SINCE 1918

**Copeland** REFRIGERATION CORPORATION, Sidney, Ohio

*For more information about products advertised on this page use Information Center, page 34.*

**FURNAS ELECTRIC CONTROLS** do the best job for **AIR CONDITIONING and REFRIGERATION**



## NEW—4 SIZES

For the first time, an ampere size to match your single and polyphase starter requirements for current rated motors through 550 volts. Now you can choose from 20-30-35-50 ampere sizes. Look for these features: 1—Each pole carries full current—no poles connected in parallel. 2—Silver Cadmium Oxide contacts—longer life. 3—Magnets require less watts thereby reducing transformer sizes and thermostat contact load—savings in cost and space.

*Write today for Bulletin 5610—1111 McKee Street, Batavia, Illinois.* A8

**FURNAS ELECTRIC COMPANY**
BATAVIA, ILLINOIS
SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES


# Dehydration Oven System on Roof Is Copeland Plant Innovation

SIDNEY, Ohio—In Copeland Refrigeration's new 270,000-sq. ft. plant here a new automatic dehydration oven to be mounted on the roof will be an outstanding feature in the production set-up for refrigeration compressors.

In a complete departure from the floor-type oven and rack system now widely used in industry, Copeland's new system will operate on a continuous monorail movement, with compressors emerging from the oven at intervals up to 15 seconds.

Containing approximately 5,600 sq. ft., the oven will be fed by conveyor rising from assembly lines on the main floor. In the oven, compressors will pass through a preheat zone at which temperatures will be held at 250° F.

In a second zone where compressors will be held for four hours, 300° air will be blown through the compressor body and stator windings to complete dehydration. The dewpoint in this zone is a maximum 30°, maintained by 20 tons of refrigeration.

A new assembly technique will see "Copelametic" compressors completely assembled except for end covers and bottom plates. Dry air will be blown directly into the stator end, circulated through the interior of the body, flowing out through the bottom. The bottom plates and end covers will be bolted on in a special assembly room adjacent to the oven.

Copeland's "Copelaweld" models will be assembled and mounted in the lower half of the steel shell for travel through the oven. As it emerges from the oven the upper half of the shell will be mounted on the lower section for welding.

According to Frank J. Gleason, executive vice president and general manager, the continuous flow design of the oven will reduce substantially the amount of time now required to dehydrate compressors. At the same time, he said that a higher degree of quality control will be maintained throughout the entire dehydration cycle from assembly to final inspection and processing.

Gleason stated that the oven will provide substantial savings in floor space and provide a more efficient system of material handling through the dehydration procedure.

The new oven is designed and built by the R. C. Mahon Co. of Detroit. Heart of the system is a gas-fired steam boiler with an input of approximately 8,000,000 B.t.u. per hour. Capacity is 200 hp. It will operate at 250 lbs. steam pressure.

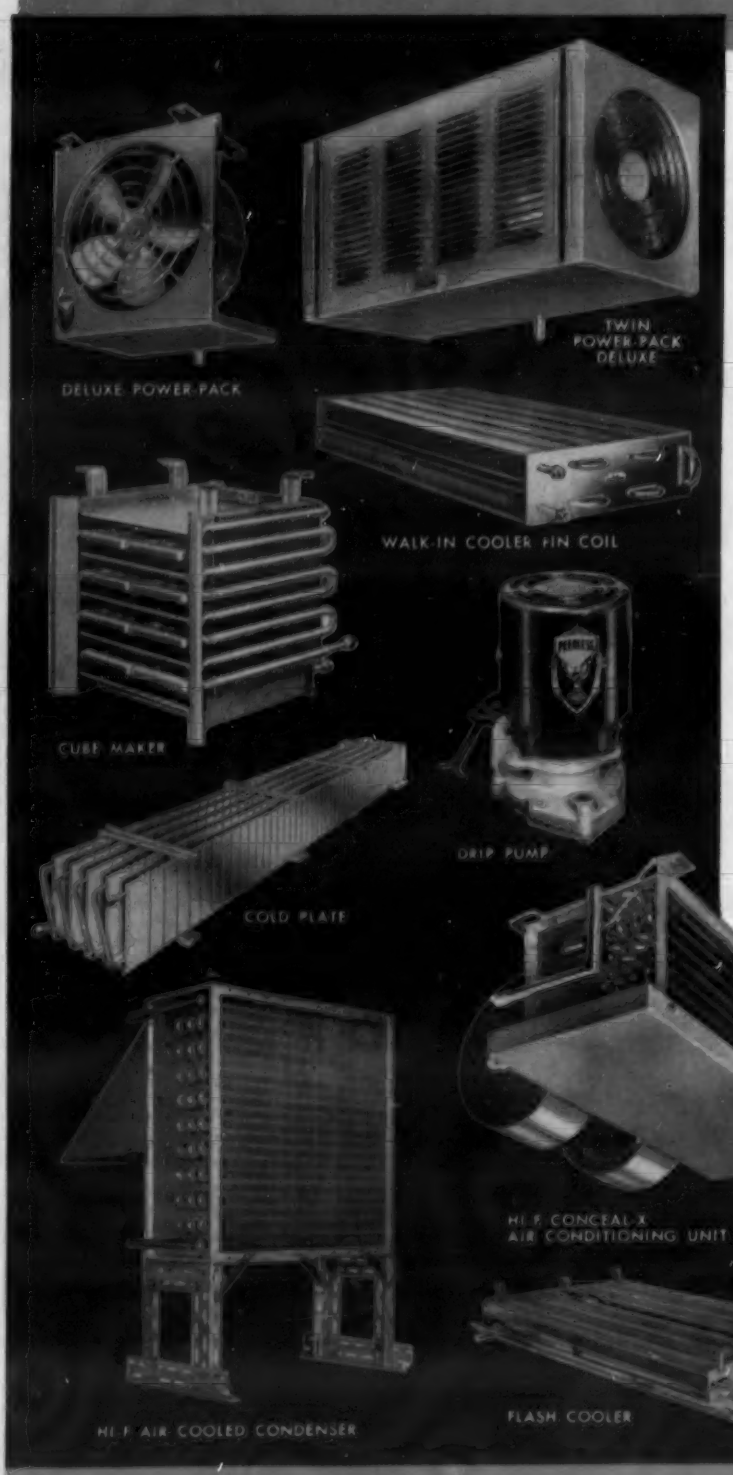
## Dalkin Names Brummett

CHICAGO — A. Dalkin Co., manufacturer of the "Adco" multiple drink dispenser, announces that George F. Brummett has joined its staff as sales manager of the Beverage Dispenser Div.

Brummett was formerly associated with Heat Exchangers, Inc. in the same capacity.

A. Dalkin Co. is a division of American Machine & Foundry Co.


**THE COMPLETE PEERLESS LINE FAMOUS FOR BUILT-IN SATISFACTION**




In Peerless you not only satisfy your customers' needs in coils, but you also give the extra advantages found only in Peerless Products, the result of 44 years experience in manufacturing coils of all types and exclusive features of design and construction. These features mean continuous satisfaction year after year because of a constant B. T. U. capacity rate.

The manufacturer or contractor who specifies and uses Peerless builds business on the firm foundation of customer satisfaction. At no other time in history has industry shown such a marked preference for Peerless air conditioning and refrigeration coils.

May we have the privilege of sending you catalogs and price lists?

**MANUFACTURERS NOTE:** *Send us blueprints of your evaporator and condenser requirements for quotation. Please indicate delivery requirements.*

**PEERLESS OF AMERICA, INC.**
MANUFACTURERS OF REFRIGERATION AND AIR CONDITIONING COILS SINCE 1912
Dept. N, 5800 N. PULASKI ROAD, CHICAGO 30, ILL., U.S.A.



**E-Z-SEE LIQUID INDICATOR**

NEW FLO INDICATOR FLAP SHOWS ALL FLOW CHANGES

Analyze flow, function of expansion valve, by means of E-Z to SEE sensitive flap, instantly responsive to variations in flow. Positively leak-proof — hundreds of thousands in use.

*Available to Wholesalers everywhere*

**REMCO**
INCORPORTED
ZELIENOPLE, PA.




*For more information about products advertised on this page use Information Center, page 34.*

## New Gibson Div. Adds 109 Heating Units to Air Conditioning Line

GREENVILLE, Mich.—A full line of air conditioning and heating equipment will be offered to its distributors by the new air conditioning and heating division of Gibson Refrigerator Co., J. L. Johnson, vice president and general manager of the Gibson Div. of Hupp Corp., announced recently.

The air conditioning line consists of packaged residential and commercial equipment from 2 to 40 tons capacity. The heating line contains 109 units, according to Earl Palmer, manager of the air conditioning and heating division.

Palmer said the heating line provides a high-boy designed for closet, utility room, or limited space application. It is available in five sizes from 70 to 125,000 B.t.u. gas fired and from 75 to 200,000 B.t.u. in oil-fired equipment.

Conventional models are available with the exclusive Hupp "Even-Flo" feature that provides constant air circulation and even temperature through a design that controls air delivery and temperature by fan modulation.

Another feature is the "Vari-Flame" that provides temperature control through stage modulation of the gas burner.

The basement model furnace is available in four sizes from 100,000 to 150,000 B.t.u. gas-fired and in oil-fired models ranging from 75,000 to 90,000 B.t.u. It is also available in suspended oil-fired models from 75,000 to 200,000 B.t.u.

The line also includes wall furnaces, ranch type units, and gravity equipment.

Palmer said that Gibson is now serving heating and air conditioning distributors in all major marketing areas.

Although the separate division allows Gibson to pursue the contract type distribution organization, he noted, progress has been made in converting appliance wholesalers to the residential and commercial air conditioning business.

Merchandising air conditioning through department stores such as Marshall Field in Chicago and J. L. Hudson Co. in Detroit has proved successful in the residential field, Palmer stated.

"These new channels have opened an entirely new field of marketing and we are planning to expand through such outlets," he declared.

## *A. F. Johnson Upped to Gibson Product Mgr.*

GREENVILLE, Mich.—J. L. Johnson, vice president and general sales manager of Gibson Refrigerator Co., Div. of Hupp Corp., has announced the promotion of A. F. Johnson, formerly of Gibson's Private Brand Div., to product manager of the Gibson Air Conditioning & Heating Div.

Earl Palmer, manager of the Air Conditioning & Heating Div., said Johnson will handle all application and merchandising programs for the division.

A. F. Johnson joined Gibson about a year ago.

## *Water Restriction For Conditioning Urged In Milwaukee*

MILWAUKEE — A special committee headed by City Engineer Eugene A. Schmidt recently told common council's utilities committee that Milwaukee should restrict the use of water for air conditioning.

Declaring that increased use of water-cooled air conditioning units placed a heavy demand on the city's water system, the report of the special committee said that air conditioners used nearly 10% of the water pumped on 1955's peak day.

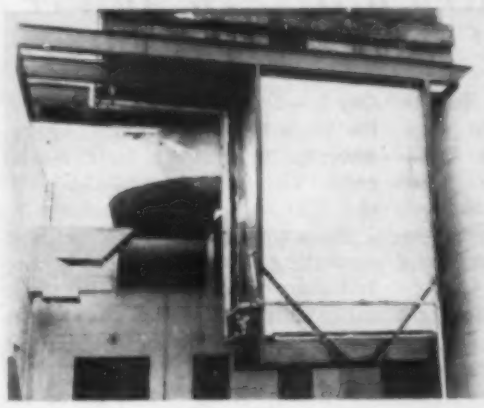
Ordinances now pending before the utilities committee would require the installation of water conserving devices on large air conditioning systems and levy a special water charge if the devices are not installed.

### Terminal Conditioned

ASHEVILLE, N. C.—Overnite Transport Co. has formally opened in its new air conditioned terminal on Sweeten Creek Rd.

The terminal was air conditioned by Ross & Witmer, Inc., Carrier sales-service firm.

## Cool 'Bundle of Joy' Snug In Its 'Cradle'



INSIDE AND OUTSIDE space was too limited for installation of air conditioning at Bert's Sundries store in Daytona Beach's new Westgate shopping center. Solution was four I beams set on opposite building walls to serve as base for the store's atmospheric tower. From these beams extends the angle iron "cradle" that holds one of the 30-ton Airtemp packaged air conditioners.

— 1906 —
Advanced engineering for 1906! The carbide gas headlamp lighted the way for daring motorists who ventured out after dark. It was 1906 when the first Brunner-engineered product appeared.
TODAY
Look to Brunner
for Refrigeration
Condensing Units...
engineered to give years
of dependable service
THE BRUNNER COMPANY, GAINESVILLE, GA.
BRUNNER MANUFACTURING COMPANY, UTICA, N.Y.
IN CANADA: BRUNNER CORP. (CANADA) LTD., TORONTO, ONTARIO
PROVEN QUALITY
50th Anniversary
BRUNNER
SINCE 1906
DEPENDABLE
Choose the unit best suited for the job... from the Brunner-Metic semi-hermetic line. Sizes range from ¼ H.P. through 3 H.P. Also a complete line of Open-Type Condensing Units, from ¼ H.P. through 100 H.P.

*G-E Minimum Standards*

## *Serviceman Given 6 Hrs. To Answer Serious Call, 2 Days on Most Others*

LOUISVILLE, Ky. — To assure prompt and efficient service on its major home appliances, General Electric Co. has established minimum standards which apply to the service provided by its distributors and dealers throughout the U. S.

The standards provide that an authorized G-E serviceman must be at the owner's door within six normal working hours after receipt of a call, if the situation involves serious inconvenience or possible property loss or damage.

Other calls must be responded to by the second working day after the receipt of the call. For example, a call received Monday must be handled no later than Wednesday.

A leeway of one additional day is allowed during peak service seasons which must aggregate no more than four weeks each year, the company disclosed.

To avoid delay when a new operating part is needed, distributors are required to stock all operating parts for which there are four or more calls per year. The part must be shipped to the servicing dealer on or before the first working day following receipt of his order, it was noted.

Parts not stocked by the distributor must be ordered by wire or phone from General Electric's parts warehouse at Zanesville, Ohio, and are shipped by air mail or air express, the firm explained.

"The technical proficiency of the authorized G-E serviceman is assured by training programs for distributors' servicemen, conducted at the Louisville plant where all General Electric major appliances are produced, and by similar programs conducted by distributors for their dealers' servicemen," it was stated.

The service standards require that distributors conduct training programs for their dealers' servicemen at least once each year on each product line, and that they provide such supplementary training as may be needed for proficiency in servicing the newest models of G-E's major appliances, was the further comment.

"General Electric recognizes that service is an obligation that goes with the appliance when it is sold and stays with it during its operating life," said John H. Miller, manager of product service for the manufacturer.

### Air Conditioning Unit Water Saver May Be Required In Chicago

CHICAGO — H. H. Gerstein, Chicago's assistant chief water engineer, warned recently the city may soon require that water-wasting air conditioning systems be equipped with devices to conserve water while operating the units.

Pointing out that air conditioning here is growing at an amazing rate, Gerstein predicted that there will be twice as many cooling plants in use by 1960 here in Chicago as there are now.

The water used in most large systems runs down the drain, Gerstein noted.

He said that at present only 10% of cooling plant owners reuse the water in the system.

Discussing the problem after addressing the American Society of Sanitary Engineering, Gerstein asserted that Chicago can't supply enough water much longer without taking one of two steps:

1. Build new water distribution facilities at great cost, to accommodate the "water wasters."

2. Enforce mandatory water conservation among air conditioning users.

### White Stockholders Approve Apex Merger

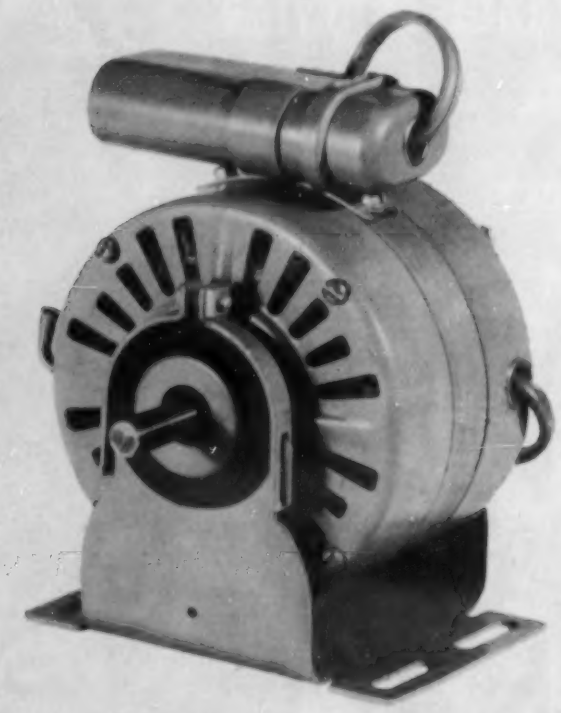
CLEVELAND — Stockholders of White Sewing Machine Corp., at a special meeting here, voted overwhelmingly to approve the merger with Apex Electrical Mfg. Co.

V. W. Fries, chairman of the board, and E. S. Reddig, president, reported that 83.8% of White Sewing's stockholders were present at the meeting, either in person or by proxy, and of the stock voted, 96.7% voted in favor of the merger.


# MARCO MOTORS

**POWERED MORE ROOM AIR CONDITIONERS THAN ANY OTHER MAKE IN THE 8 YEARS OF THE INDUSTRY'S GREATEST GROWTH**

**CUSTOM DESIGNED MOTORS AT MASS PRODUCTION PRICES To Meet Your Engineering Specifications**



Shaded Pole Motors 1/100 to 1/4 HP

Permanent Split Capacitor Motors 1/100 to 1/3 HP

*These Are the Reasons*

**MARCO** has proven its versatility by producing in volume 39 different models for a leading equipment manufacturer in a single year

**MARCO** delivers electric motors in any quantity — from 100 to 100,000 — in any specified design

**MARCO** makes only one product — QUALITY MOTORS

**MARCO** has **10** years experience in producing more than **6,000,000** fractional horsepower motors for air moving equipment manufacturers

**Experienced Marco Field Application Engineers Stand Ready To Help Solve Your Small Motor Problems**

Greater New York City Area
**W. E. MACBETH**
88 Cooper Drive
New Rochelle, New York
Phone: New Rochelle 2-0802
**Formerly with Howard Industries and Nash Kelvinator**

Cleveland Area
**MILTON E. MEYER**
Commercial Electric Company
1250 St. Clair Avenue N.E.
Cleveland 14, Ohio
Phone: CHerry 1-2886

Chicago Area
**SAMUEL STEIN**
Spartan Engineering Company
119 S. Jefferson Street
Chicago 6, Illinois
Phone: CEntral 6-3905

St. Louis-Memphis-Little Rock-Southern Illinois Area
**R. W. & O. A. BAUMANN, JR.**
575 Arcade Building
St. Louis, Missouri
Phone: CEntral 1-1677
**Associated 8 years with Baldor Electric Co.**

Upper New York State
**MILTON C. MATTHEWS**
P. O. Box 612
Rochester 2, New York
Phone: BRowning 2143
**Formerly with Delco Appliance Division, General Motors Corporation**

or Write — Phone

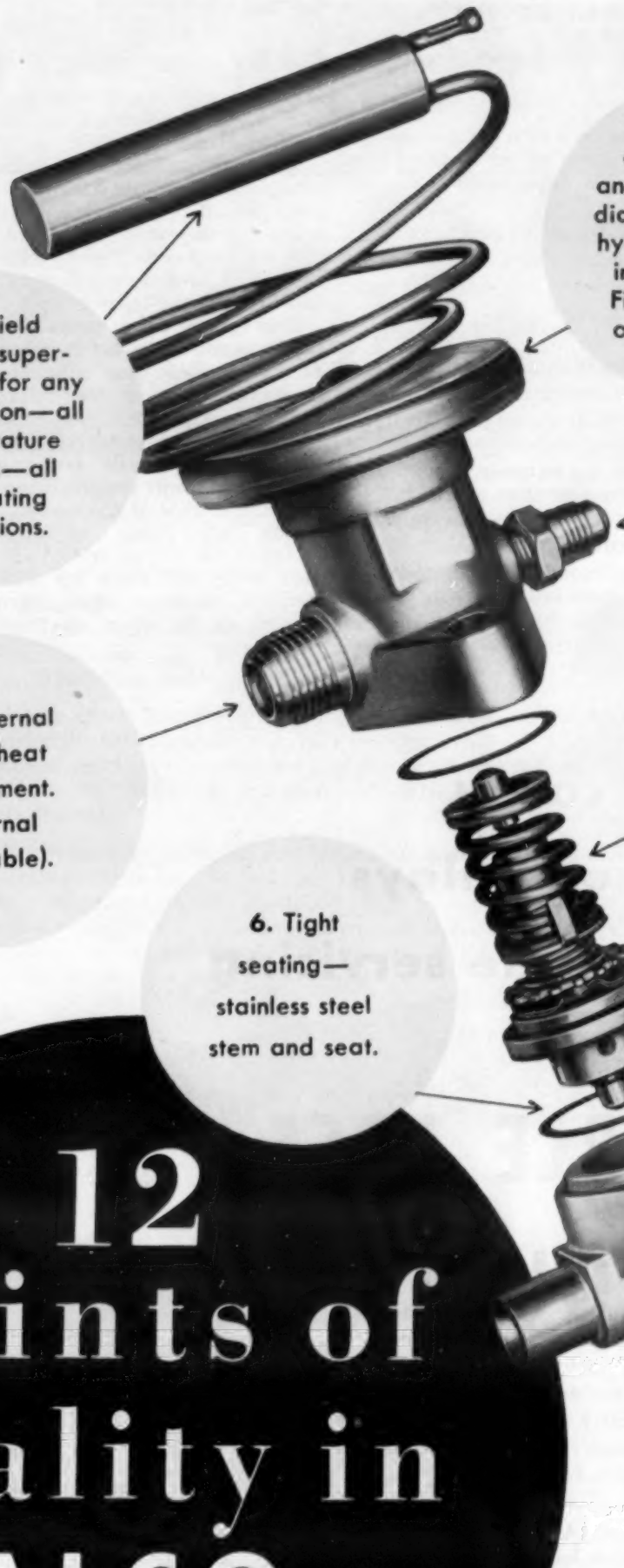
**ENGINEERING DEPT. — MARCO INDUSTRIES, INC.**
Womelsdorf, Pennsylvania (suburb of Reading)
LUther 9-2515

# MARCO INDUSTRIES, INC.

## WOMELSDORF, PENNSYLVANIA




*For more information about products advertised on this page use Information Center, page 34.*



1. Field proven supercharges for any application—all temperature ranges—all operating conditions.

2. Power element case and stainless steel diaphragm atomic hydrogen welded into one piece. Field tested for over 25 years.

3. External superheat adjustment. (Internal available).

4. External equalizer. (Internal available).

5. Simple cage assembly contains only one packed stem. Replaceable for quick servicing. Interchangeable for wide capacity range.

6. Tight seating—stainless steel stem and seat.

7. Outlet connections to match distributor requirements.

8. Easy to install, light weight flanges—in widest variety of body styles and connections.

# 12 points of quality in ALCO

"T" SERIES THERMO VALVES

**ENGINEERED THROUGHOUT FOR TROUBLE-FREE OPERATION!**

9 Rugged come-apart constructions—corrosion-resistant materials.

10 Can be mounted in any position.

11 Simple, compact design — only three major parts—interchangeable to provide wide capacity and operation ranges.

12 Easy to inspect, clean and service without breaking line connections—no special wrenches or gauges required.

**BUY QUALITY—BUY ALCO**

**NON-ADJUSTABLE, HERMETICALLY SEALED MODELS ALSO AVAILABLE**

WRITE FOR BULLETIN 171-56

## ALCO VALVE CO.

853 KINGSLAND AVE. • ST. LOUIS 5, MO.

**The one complete line of refrigerant controls:** Thermostatic Expansion Valves, Refrigerant Distributors, Solenoid Valves, Suction Line Regulators, Flooded Evaporator Controls and Reversing Valves.

7217

*For more information about products advertised on this page use Information Center, page 34.*

# *Inside Dope*

By GEORGE F. TAUBENECK

*(Concluded from Page 1, Col. 1)*

mercial attaches of various European governments, I should like to illustrate the fascinating differences between our 48 states not in terms of dry statistics which quickly crumble from mind, but rather by local speech imagery, colorfully homemade, which the eye can relish and the ear remember.

A West Virginia hostess, for example, observed the grass was "hurtin" to be cut. In Vermont, a little old lady commented that a niece kept her house "poison neat." During the war, the tail-gunner of my Flying Fortress, a boy from Arizona, used to greet new equipment with the remark "we need that like an elk needs a hatrack."

To gather such idioms, I have already written to the governors, senators, and universities of all the 48 states, and have obtained a rich and enthusiastic response. But the keenest phrase collectors comprise a reservoir I have not yet been able to tap: our alert, observant and articulate salesmen.

As they travel about they seldom fail to note these striking expressions which often proclaim, unmistakably as a birth certificate, where a man comes from.

If it is possible to appeal to your own readers for picturesque idioms which they have noted, I should be most grateful. There is no other way to complete a collection which will do justice to the zest and flavor of our folk-talk, and the verbal inventiveness of our people.

After using these key-idioms in the above talk, I plan to chart them state by state, in a chapter tentatively titled "Atlas of American Folk Talk" in a book on Colorful Speech Around the World.

GEORGE BIJUR

*Answer:* As a thought-starter, here are a few remembered from boyhood days in southern Illinois.

"Independent as a hog on ice."

"Spit fire and save matches."

"Alike as two peas in a pod."

"Slower than molasses in January."

"Tight as a hoot-owl."

"Homelier than sin."

"Use it up, wear it out, make it do or do without."

"Better be needy than greedy."

"Funnier than a crutch."

"A fur piece" (several miles distant).

"Nervous as a long-tailed cat in a room full of rocking chairs."

*Fellow "Dopes":* Your contributions to this project will be welcome.

## *Red-Faced Surveyors*

Advertising researchers are wringing their hands over a TV rating dispute nowadays.

Question of how many sets were turned on during the political convention goes much deeper than differences in the findings of two survey firms. (One showed TV viewing fell sharply; another "proved" it went up.)

This conflict raises *fundamental* doubt about market research as a whole—covering consumer products, magazine readership, as well as the size of TV audiences. All such research presumes that a small sampling of the public will present a representative view of the whole.

One advertising executive mourns: "Of course, no two surveys ever will come up with identical findings. But when they're as far apart as these two studies, market testing gets a black eye."

## *Foreign Affairs*

Although nearly everyone "Dope" talks with believes that Egypt's incipient Hitler, that Nasser guy, ought to be cut down to size, here's an interesting angle.

Rudy Lotz of the Virginia Smelting Co. writes: "What's Suez for the Goose is Suez for the Gander. If Britain nationalizes industries within her borders how can she argue very forcefully against Mr. Nasser's grab of the Canal Company? Seems to us that the time to argue for international control was back when the ships of Israel were refused transit."

## *How To Win the Election*

"Leave 'em laughing" if you want to be President. That is the conclusion of Sheldon Cherney, who earned a Ph.D. degree by struggling through 614,769 words of campaign speeches in search of jests, quips, and belly-laughs.

Cherney obtained his doctorate at the University of Southern California. This fall he is an assistant professor in Michigan State university's department of basic communications.

All of the winning candidates since 1940, Cherney notes, used humor frequently in their speeches.

Tom Dewey was the most dismal candidate in the humor department, and you know how far he got. Cherney figures Dewey used humor (and pretty poor stuff at that) in 29% of his 1944 speeches, while Roosevelt was funny in 69% of his.

Dewey struggled up to 50% "humor" speech content in 1948, but it wasn't good enough. Some people can tell 'em and some can't. Dewey couldn't.

Humor got to be quite an issue in the 1952 campaign, when Stevenson couldn't resist cracking wise during 84% of his opportunities. Ike kept asking what was so doggoned comical about the Korean War, the national debt, inflation, and high taxes, and kept humor in his talks restricted to 46% of his speeches. At the same time, he did get solid laughs when he tried for them.

The forthcoming campaign looks like a dead heat in the humor division, Cherney figures. Stevenson's gag count is down, while Ike, who is a quick man with a comeback, probably will be a little more gay.

"Eisenhower just can't help using humor," says Cherney.

Roosevelt wasn't far behind Stevenson's 1952 humor record when he ran for his third term in 1949. Roosevelt was witty in 78% of his speeches during that campaign.

Lincoln was a great humorist, and many political analysts believe that his wonderful story-telling was his greatest political asset.

Even Cal Coolidge employed pungent wit effectively. He didn't have much to say but when he did he left 'em rolling in the aisle.

Herbert Hoover made it in 1928 without benefit of jokes, but he wound up as a straight man to Roosevelt in 1932.


**FREE yourself of costly**

- **production delays**
- **after-the-sale servicing**

**with**

**TROUBLE FREE**

**H&H QUALITY**

*We laboratory control the grain size you order*

Not only is the grain size and temper of H & H tubing laboratory controlled to meet your specifications *exactly* — but other care is also taken to help you speed production and keep your own customers satisfied. For example, all tubing ends are sawed clean with a minimum of burrs. If you wish, standard 50' refrigeration coils can be delivered with capped, plugged or crimped ends to keep moisture out. In addition, the capped ends permit you to reseal the tubing after sawing off a desired length. And finally, the latest in electric annealing furnaces help give H & H tubing a brighter, more uniform, longer lasting finish — helps *sell* your customers and *keep* them sold.

*You always get exactly the degree of hardness you specify*

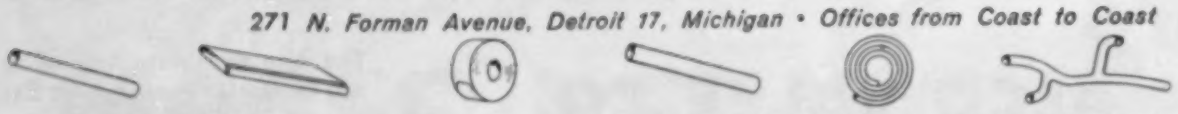
Originators and Sole Makers of METALFLO Tubing

Expect the BEST brass and copper products from

**H & H Tube**

**AND MANUFACTURING COMPANY**

*271 N. Forman Avenue, Detroit 17, Michigan • Offices from Coast to Coast*



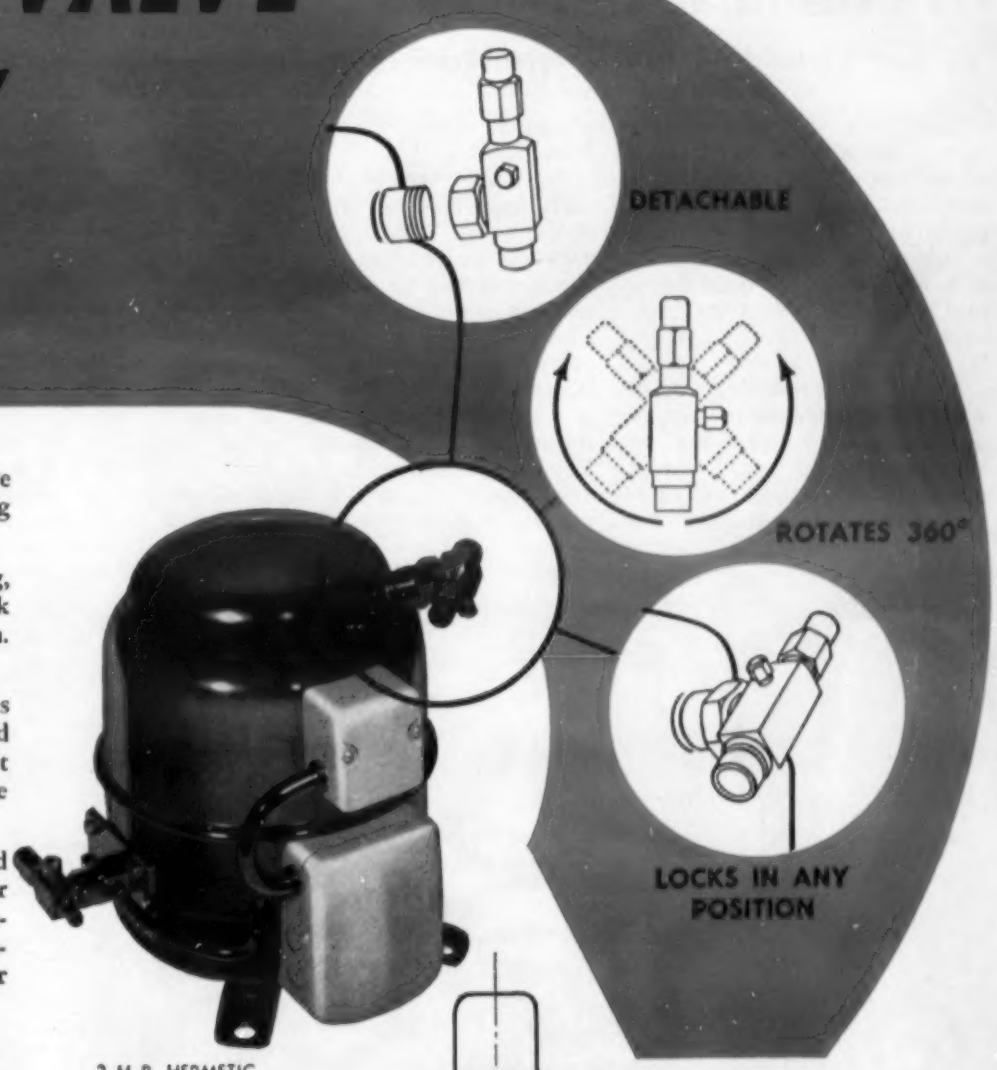
METALFLO LOCKSEAM COIL STRIP AND SEAMLESS TUBING TUBULAR PARTS




*For more information about products advertised on this page use Information Center, page 34.*

# NEW ROTALOCK VALVE

## adds Maximum Flexibility to installation of Tecumseh air conditioning compressors




Rotalock is a new type of detachable valve which answers the trend toward more flexible production of air conditioning systems by permitting the positioning of suction or discharge connections at any angle throughout 360°.

Rotalock may be set at any angle to correspond with the direction of the tubing, eliminating short or compound bends. Once this angle is determined, Rotalock may be locked into position for maximum ease of installation in the system. This angle may be changed or adjusted as necessary.

The new Rotalock valve will have approximately the same overall dimensions as the old valves. Most important the working dimensions have been improved considerably. This is accomplished mainly by relocating the gage port so that it is at right angles to the valve body. In this position it is more easily accessible without adding to the overall dimension.

Tecumseh air conditioning compressors now provide an easy, economical method of meeting individual customer's requirements. By ordering one compressor for all applications the customer may keep inventory down and adjust production as needed. Further savings are possible due to the time saved, both in factory and field installation. In addition, the new Rotalock represents a major saving in original cost over flange valves.

## NEW *flexible* compressor design

SPEEDS PRODUCTION—LESSENS INVENTORY

ONE OVERLOAD FOR AIR AND WATER (EXCEPT 5 H.P.)

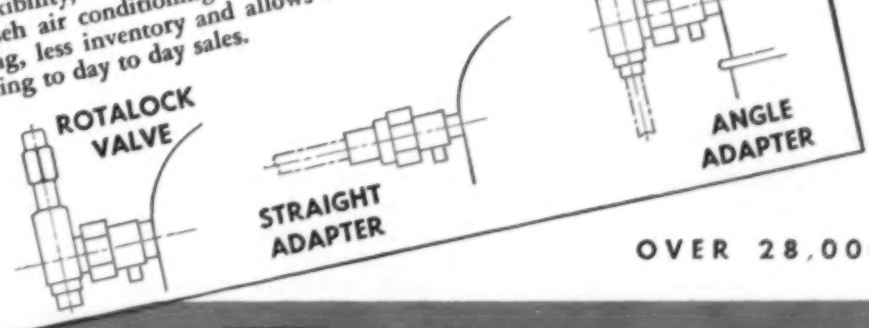
ONE BASIC SPUD FOR ALL TYPES OF CONNECTIONS

To change from a valve to a tube, tube to valve, or even to different sizes of valves or tubes it is no longer necessary to order a new compressor. Tecumseh customers will now only have to order the component parts they need and install them on compressors in their plant. No delay in changing, no excess inventory! Tecumseh Rotalock provides the answer.

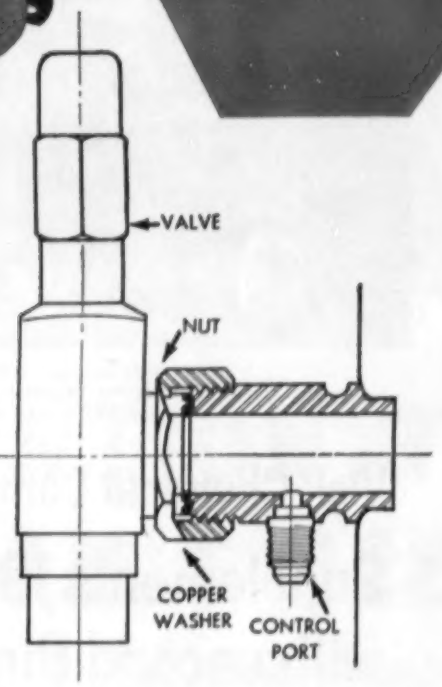
Each compressor of this type is now equipped with universal spuds welded to the housing in place of present suction and discharge valves or tubes. This basic connection will take any normal size valve or tube used by our customers. One bill of material covers the compressor and valve or tube connections or adapters are ordered separately as component parts. Three types of connections for either the suction or discharge side are then possible according to the wishes of the customer. These are illustrated below.

To further eliminate ordering, production, and inventory problems, these same compressors can now be used for air or water cooled applications. In all cases except the 5 H.P., a single overload handles either. In addition, all of these compressors are water-proofed and corrosion resistant.

The flexibility, economy and simplicity connected with the use of these new Tecumseh air conditioning compressors means fewer bills of material, easier ordering, less inventory and allows the customer to vary his production lines according to day to day sales.




## positive pressure seal




The basic elements of the new Rotalock are illustrated in the drawing above. Of major importance is the design of the seating arrangement between the spud and the valve or tube adapter. Note that the spud has a groove machined around the circumference of the face. A corresponding but smaller ridge is machined on the face of the valve or adapter. By inserting a soft copper washer between these faces, a tongue and groove seal is formed by the pressure of the nut. As pressure is applied, the washer is forced into the groove by the ridge on the valve, resulting in a positive seal around the full circumference of the face. Further, the seal will have equal pressure on all areas. Note that as more pressure is applied, the greater will be the sealing effect. This principle eliminates all possibility of leaks due to crimped gaskets, loose bolts, or imperfect thin gasket materials.

OVER 28,000,000 COMPRESSORS IN USE TODAY

*The World's Largest Producer of Compressors for the Refrigeration Industry*

**TECUMSEH PRODUCTS CO.**

Tecumseh, Michigan
Marion, Ohio

EXPORT DEPT. - P.O. Box 2250, 24330 Michigan Ave., W. Dearborn, Michigan

**Taming an 'Elephant'**

# How G-E Went About Curing Birth Pains Of 'Automated' Package Conditioner Plant

*By Carl W. Lomison, Manufacturing Training Program, General Electric Co.*

Last year it was reported that General Electric had bet $5 million on the future of the commercial packaged air conditioner market by the completion of a program of plant expansion and renovation of manufacturing facilities involving that expenditure at its Bloomfield, N. J. plant.

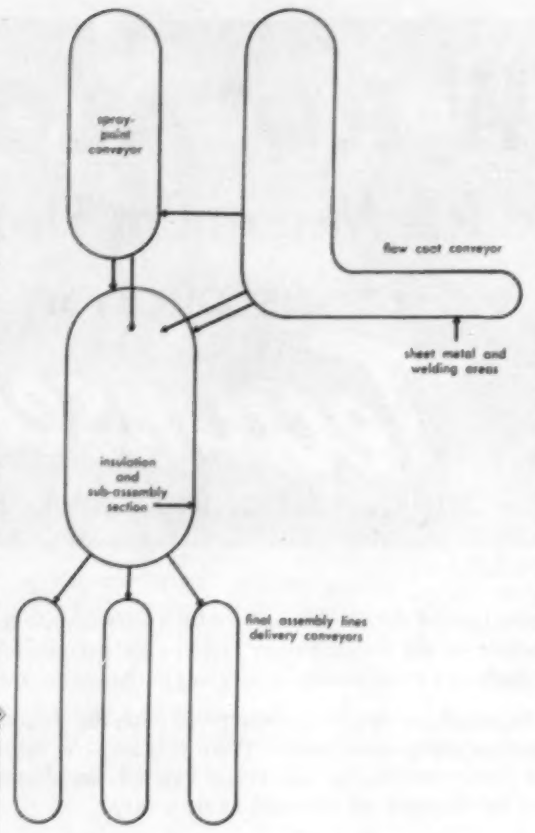
To double productive output with only a one-third increase in floor space called for a continuous product flow facility efficiently utilizing available space with automatic conveyors for finishing, assembly, testing, material transportation, and storage.

As in any entirely new facility there were certain "birth pains" encountered. Although the investment had at first been sometimes referred to as the "monster" it soon became generally admitted that we really had an untrained "elephant" potentially capable of great work. It was my fortunate experience as a trainee on G-E's Manufacturing Training Program to be given an assignment in the field of making this elephant work.

Most of the early difficulties were concerned with the supply of parts carried on overhead conveyors. Let us consider the situation in but one area of the plant.

Shown on the schematic diagram is an overhead conveyor system supplying parts to three final assembly lines. To consider only painted sheet metal parts, each assembly line might be running a different type unit with each consisting of some fifty different parts.

Although all parts after fabrication in the sheet metal and welding shops are hung on the flow coat line for paint, their paths to the correct final assembly line after flow coat vary considerably depending upon the part involved. Some parts go to the spray paint line, some to the insulation area, some to the float line, or practically any combination of these. Eventually all parts are transported to the individual final assembly line delivery conveyors by a transfer from the float conveyor.




OVERHEAD CONVEYOR system supplying parts to three final assembly lines is shown in this schematic diagram. It is a phase of the "automated" production operation for production of packaged commercial air conditioners at the General Electric plant in Bloomfield, N. J. It is possible for each assembly line to be running a different type unit, with each consisting of some 50 different parts, supplied by the "float line" continuous conveyor. How this complicated "conveyorized" operation was mastered to achieve the desired production efficiency, is related in the accompanying article.

### *Some 300 Parts In Process In 'Float'*

It can be appreciated that there is a considerable coordination problem to assure the supply of correct parts where they are needed at the proper time. Especially at assembly line changeover periods is the situation aggravated for there could be some 300 different parts in process in "float," one of which could easily cause loss of production were it not available as needed.

At the outset of operations a year ago there was no clearly defined procedure for making the most effective use of conveyors. Parts were random hung in the sense that any part could be hung on any conveyor hook without particular reason.

Material flow through the shop was being hampered and excessive in-process inventory being maintained to assure against part shortages. In short, the conveyor system was a bottleneck preventing maximum utilization of the extensive new plant.

### *'Small Iron-Pointed Stick Controls Elephant'*

By viewing the problem on an "elephant" training basis, we learned that the beast obeys the commands of man through respect for a small iron pointed stick carried by his master. We had to find this appropriate discipline device to break our animal of his jungle laziness and non-productive actions and shoulder his share of the burden.

The entire field of "conveyorized" production was approached on the basis of controlled physical flow, not merely ease of handling of parts and assemblies. Detailed and exact planning was employed to insure maximum utilization of all conveyors. Conveyors were made an integral part of manufacturing operations and regimented to preplanned control as closely as any work station on a final assembly line.

The result showed itself in the form of sequential or pattern hanging of parts and subassemblies on conveyors. Essentially this meant specific conveyor location for all parts.

### *Pattern Establishment Was Key to Problem*

Obviously the pattern establishment was the key to efficient conveyor application and involved considerable study to arrive at optimum operating methods. It should be emphasized that these patterns were not forced to be evolved for the sake of uniformity. They resulted from thorough analysis of the nature of the product.

Once the basic facts were documented in understandable manner, broad principles and controlling factors appeared. When defined quantitatively they could be manipulated to form plans resulting in optimum procedures, substantial work simplification, more precise control, and better management.

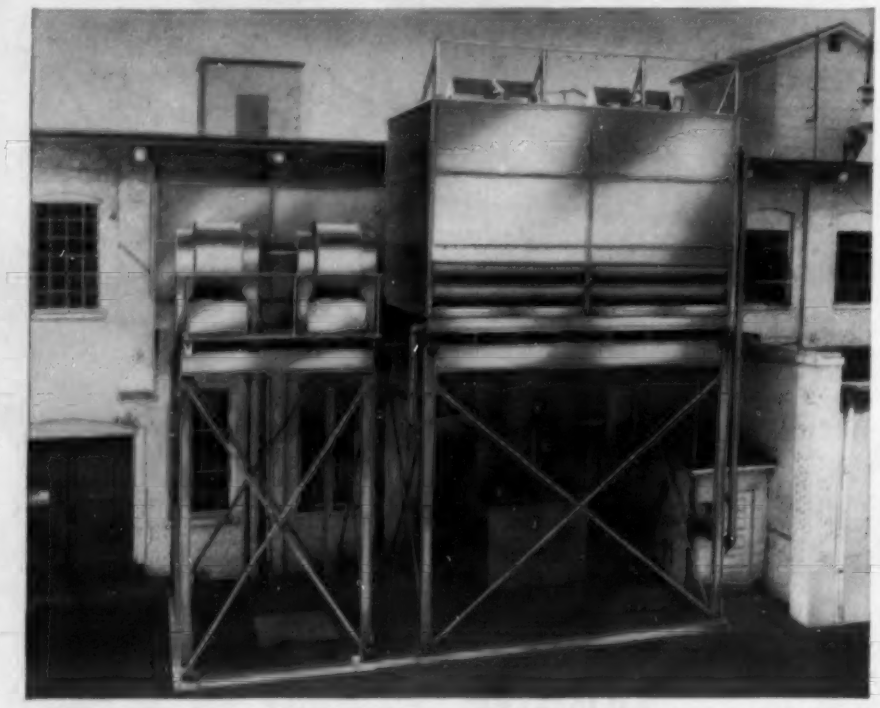
Again since the conveyors were but one factor in the overall manufacturing operation the individual conveyor programs were only valuable to the extent that they meshed with the single whole to produce a well coordinated entire operation.

### *How Patterns Were Established*

As an example, let us briefly consider how patterns were established for conveyors carrying sheet metal parts. The study was approached through successive steps as follows:

1. Analysis of product to determine significant categories of parts (all parts were classified as small parts or major parts).
2. Development of quantitative relationships between small and major parts by unit type.
3. Determination of ideal hanging method of all parts on various conveyor lines.
4. Development of standardized hanging techniques of all parts.
5. Calculation of lengths of conveyor line required to hang

*(Concluded on Page 12)*

Binks cooling towers—a youngster and an old-timer—work side by side at Vick Chemical Company, Greensboro, N. C. Tower at left was installed 17 years after tower at right which still serves faithfully.

**Vick Chemical Company...**

**Supplements 1936 installation with second Binks cooling tower**

17 years after their first Binks cooling tower installation, Vick Chemical needed additional cooling capacity. The dependable performance of their existing Type "K" mechanical draft tower was a decisive factor in selecting a second Binks cooling tower installation.

**New Binks Series 3-B tower cross-connected with first tower**

The new Binks Series 3-B cooling tower is used for condensing process steam. The old tower is presently used for the air conditioning system. Each installation is independent of the other but cross-connected so that each may stand by for the other in cases of emergency or during periods of maintenance.

**Built-in long life**

Case histories proving the dependable performance of Binks cooling towers are not uncommon. All parts are built to rigid specifications which insure long life. And, Binks cooling towers are designed for easy periodic maintenance, a factor appreciated by those who must do the work.

**For full information**

on Binks complete line of mechanical and natural draft cooling towers, write directly to the address below. Binks engineers will gladly study your needs and help you select the correct tower for your requirements.

Binks
EVERYTHING FOR WATER COOLING

A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

**Binks Manufacturing Company**
3116-38 Carroll Ave., Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY




*For more information about products advertised on this page use Information Center, page 34.*

*So Halstead & Mitchell Engineers Said:*

# "WE'LL PAY EXTRA ATTENTION TO WHAT OUR CUSTOMERS CAN'T SEE!"

Someone said, "What you can't see won't hurt you." Well, that can't work in the refrigeration and air conditioning industries. We know, because every day we live with the problem of keeping the things our customers can't see from hurting them.

***Take Freon, for example.*** Was there ever a peskier gas for picking out the most minuscule holes in a system, and seeping away to the atmosphere? Brazing techniques, machining techniques, testing techniques all have to be exactly right. If they're not and that gas escapes—well, you know the answer as well as we. That's why our manufacturing techniques are the admitted most advanced in the industry.

***Take fungus, for example.*** Spores are everywhere, and there's no happier environment for raising fungus than the warm, wet interior of a cooling tower. There's nothing that will put a cooling tower out of action faster, either, than collapse of the wetted deck surface due to fungus attack or rotting. Sure we could settle for some of the woods known as "nature's own remedy"—but we don't. We pressure-creosote all cooling tower wood, using 159 elements toxic to fungus. That's why we're the only ones in the industry who give a 20-Year Guarantee on the wetted deck wood against failure due to attack by rotting or fungus!

***Take rust, for example.*** You can see the results, sure. But you can't see the slow corrosion attacking the metals in your systems and eating them away. The answer is not simply in a paint or a galvanize coat. The answer lies in a combination of protections to give inertness, water and vapor seal, tremendous adhesion and toughness. We don't paint; we hydraulically force these special protections (Vinyl Zinc, Vinsynite and chlorinated rubber) into every nook and cranny, so that rust can't get a start.

***Take acid and chemical attack, for example.*** We know that acids and chemicals will clean systems, but we also know that they eat metal as well as lime and other impurities. So we design mechanically cleanable condensers, and you never have to add a drop of acid to clean any Halstead & Mitchell water-cooled condenser.

It's a matter of trust, we feel. As this industry has grown, we have grown. From mammoth extrusion presses and draw benches for drawing our own copper tubing, to leak detection equipment for measuring microns of Freon, we are the most completely and efficiently tooled manufacturer in your industry. We have looked ahead to your growth and ours—and to this end, you may always depend on Halstead & Mitchell for the finest in quality, delivery and performance.

Manufacturer of the Industry's
Broadest Line of Water-Saving
Devices for Air Conditioning
and Refrigeration

HM
Halstead & Mitchell

Cooling Towers
Air-Cooled Condensers
Water-Cooled Condensers
Finned Surface & Coils

BESSEMER BUILDING, PITTSBURGH 22, PA.

## *Controlling Conveyors – –*

*(Concluded from Page 10)*

various numbers of sets of parts on different conveyors by unit type.

6. Establishment of standard hanging sequences (order of one particular part following another) for all major parts of all unit types produced.

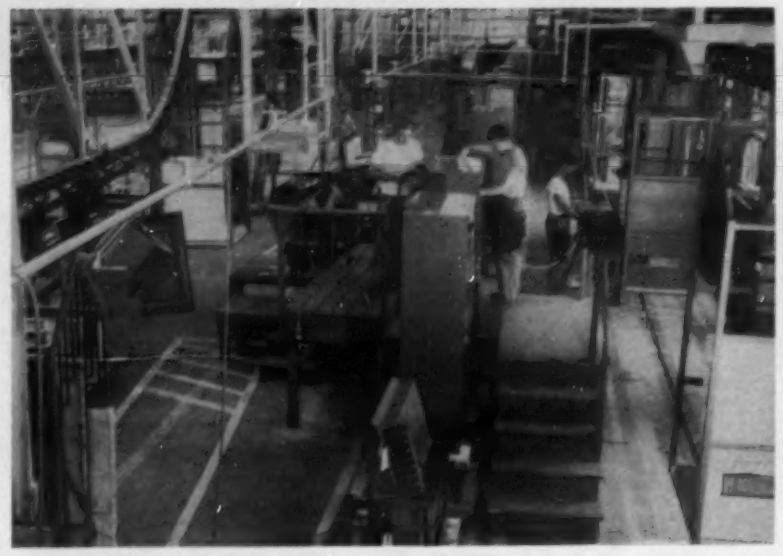
7. Determination of small parts hanging spots on all conveyors. Small parts were hung in quantity on a standard aluminum rack. Thus conveyor allocation of space for them had to consider the variables of production mix by unit type and quantity.

8. Development of a standard relationship for all conveyors between small parts space and major parts space for all foreseeable production mixes. On the flow coat conveyor, for example, the relationship was 6 ft. of conveyor for small parts for every 14 ft. allocated to major parts.

9. Development of simple, easily maintained and altered line identification procedures to assure correct parts hanging. Color coding and conveyor hook numbering were employed.

10. Formulation of three basic standard patterns applicable to all conveyors. These three patterns would adequately handle any production mix the manufacturing plant could economically produce.

All parts then had a definite conveyor location considering all factors required for coordinated and controlled material flow. The establishment of disciplined conveyor operations afforded no loss of flexibility in manufacture for the desired degree of flexibility was built into the patterns evolved.



"CONVEYORIZED" ASSEMBLY LINE in operation reveals (at front center) a completely assembled and tested refrigeration cycle moving along on a track to be fitted with a casing that has the proper sheet metal parts installed from a "float line" (continuous conveyor) which supplies a continuous flow of such parts.

PAINT IS SUPPLIED to parts on the continuously moving conveyor lines by means of the "flow coating" process.

The most impressive immediate advantages accrued were:

1. Improved inventory turnover
2. Shorter manufacturing cycle time
3. More efficient utilization of our large and costly finishing plant

Controlled physical movement permitted more effective balancing of shop operations and elimination of bottlenecks. Planned cost reduction activity was enhanced.

### *Critical Control Points*

The production control job was made easier because it was possible to know at all times exactly what was happening by operation of a minimum number of critical control points. These stations were tied into a central operations center by means of a tel-autograph communication network.

A perpetual inventory of all "floating" material was possible of being maintained by the principle of management by exception, since the normal was definitely established. A standard method of operating replaced much of the need for clerical control.

By such an approach the overhead conveyor system became a critical nerve center medium for controlling a large part of the manufacturing operations. Certainly the correction of these conveyor problems was to a large extent responsible for the fine production performance we have enjoyed in our new facilities in the very first year of operation.

By fashioning our "elephant" prod our beast works all day seemingly content with his lot for he does not flail or fail us. It seems that an exceptional trait is an elephant's gentleness and willingness to work for those whom he regards as friends, and his vindictiveness towards his enemies.

## Science Center To Be Air Conditioned

CHICAGO—One of the largest industrial science centers in the United States will be opened by Cook Electric Co. starting in early October, it was announced here by Walter C. Hasselhorn, president.

The new Cook Technological Center will be operated by more than 1,000 research scientists, engineers, technicians, and other staff personnel, working in seven single-story buildings with a total floor area of 158,00 sq. ft.

The seven air conditioned and acoustically treated buildings that are now scheduled and under construction are located on a 15-acre tract in Morton Grove, Ill., a suburb northwest of Chicago. Included in the center are a heliport and paved parking facilities for 1,200 cars.


WHITE-RODGERS CONTROLS FOR MODERN REFRIGERATION

**"They're strictly trouble-free"...**

"For my customers, *continuous* refrigeration is a must. You can bet I use White-Rodgers controls on all my installations. Even on the toughest applications, I know I'm set—because White-Rodgers quality pays off in *trouble-free* system operation!"

For control of quick freeze cabinets, fruit storage, farm freezers, walk-in boxes, floral, meat and vegetable display cases, blood banks . . . wherever "trouble" means "loss" . . . smart servicemen refuse to take risks. They rely on White-Rodgers exclusive Hydraulic-Action controls.



Type 1609-31 has special 15½ inch air-sensitive bulb to give quick and accurate response to slightest temperature change. Range −20 to +50° F., Adj. Diff. 3 to 25°, 5 ft. capillary. Other types available to cover ranges from −20 to +75° F. with capillary lengths up to 20 ft. Write for catalog.

*Controls for modern comfort*

WR WHITE-RODGERS

ST. LOUIS 6, MISSOURI TORONTO 8, CANADA




*For more information about products advertised on this page use Information Center, page 34.*

## *108 Coil Springs Support Sound Room Where Noise Is Pinpointed*

STAUNTON, Va.—The phrase "firm yet gentle support" could well apply to a Sound Study Room at the new Westinghouse Air Conditioning Div.'s plant here, since the room is supported entirely by 108 coil springs.

The unusual room with 8-in. thick concrete walls is a part of the Development Laboratories of the Air Conditioning Div.

It has been known for some time that certain components of air conditioning units produce undesirable noise. In this Sound Study Room, however, it has been possible to pin-point the origin and the frequency of that noise. Background sound frequency ranges are eliminated and thereby investigations can be concentrated on a specific noise that is perhaps the real offender.

The Sound Room has inside dimensions of 20 by 30 ft. and is actually a "room within a room." Separated from the inner room by a 12-in. air space, the outer shell consists of 8-in. thick solid concrete block walls, floor, and ceiling. The walls and ceiling of the inner room are covered with 2 in. of glass wool held in place by wire mesh.

An elaborate system of air conditioning ducts brings conditioned air in and out.

The complete Air Conditioning Development Laboratories occupy close to 10,000 sq. ft. of space in the plant. There are a total of five controlled temperature and humidity rooms, the largest being 25 by 35 ft. and the smallest 15 by 25 ft.

In these rooms any reasonable and contemplated combination of temperature and humidity can be created. Relative performance tests between old and newly-designed units are conducted here. Underwriters' and American Gas Association specification tests are carried out and witnessed.

The results of development studies in these laboratories mean more efficient performance in the design of future air conditioning units now on the drawing boards.

## White-Rodgers Hires Loewy To Develop New Product Design

ST.LOUIS — White-Rodgers Co., manufacturer of temperature controls, has retained Raymond Loewy Associates for new design projects involving the company's products, packaging, display materials, and trademark styling.

White-Rodgers executive, engineering, sales, and advertising staff will work closely with the Loewy organization in developing new design concepts for present products and new products for the future.

Primary objective, according to company officials, is to help promote increased sales for original equipment manufacturers and dealer-installers in the heating, air conditioning, and refrigeration fields.

### National-U. S. Radiator Moves D. C. Warehouse

WASHINGTON, D. C. — National-U. S. Radiator Corp. has moved its branch sales office and warehouse here from 4034 Georgia Ave., N.W., to 6310 Chillum Place, N.W.

According to H. W. Rush, branch manager, the new local headquarters for the company's Heating and Air Conditioning Div. contains about 4,000 sq. ft. of floor space.

Warehouse capacity is considerably larger than was formerly available. Office areas are completely air conditioned, and adequate parking facilities exist for customers and employes.

### Baptist Church Cooled

MACON, Ga. — Mabel White Memorial Baptist church here has announced plans for a proposed $300,000 expansion program that calls for a new air conditioned church sanctuary with a seating capacity of between 2,000 and 2,500.

## 12-Hour Windy Soaking Fails To Disclose Any Moisture Entering Air Conditioner

MARSHALLTOWN, Iowa—To show that the new "Stowaway" air conditioner is completely waterproof engineers of Lennox Industries gave it a rain test.

The Stowaway was set up outdoors, just as it would be on a back-yard slab, and a deluge from two shower sprays was directed at the unit.

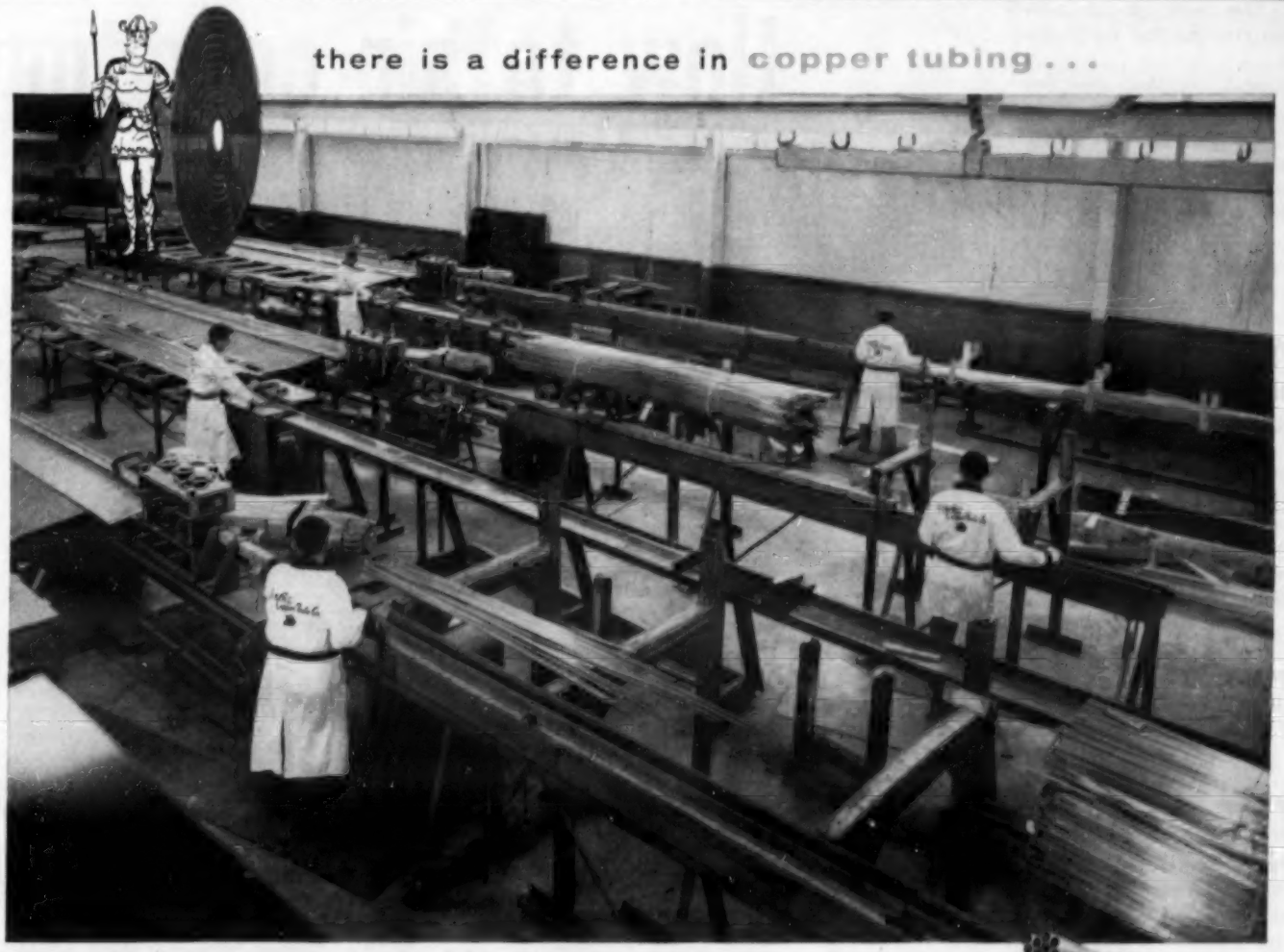
A 20 m.p.h. wind with gusts up to 35 m.p.h. added to the drenching — which continued without interruption for 12 hours, 6 hours with the condenser fan off and 6 hours wtih the fan turned on.

Just so no water could sneak into the unit undetected, the engineers coated the entire inside surfaces of the cabinet with chalk dust during assembly. In this way, the slightest drop of moisture would leave a telltale spot inside the unit.

After the 12-hour windy soaking of the unit, examination disclosed no evidence of moisture entering the cabinet.

SET UP outdoors, this Lennox "Stowaway" air conditioner was deluged by two shower sprays for 12 consecutive hours, six with condenser fan off and six with it on, to rain test the unit to see if any water could seep into the cabinet. None did.

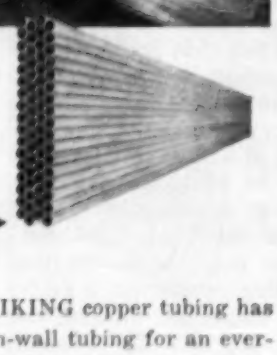

there is a difference in copper tubing . . .



the difference in VIKING is

when we say "straight"...we mean...

STRAIGHT – STRAIGHT AS AN ARROW!



A battery of electrically controlled Mackintosh-Hemphill rotary tube straightening machines keep VIKING copper tubing absolutely, unvaryingly straight. In addition, these machines precisely temper the tubing imparting to it correct surface hardness . . . thus developing the proper strength and ductility vital in tubing used for air conditioning and refrigeration purposes. This uniform temper assures trouble-free fabrication resulting in substantial savings in time and labor.

This important "difference" in VIKING copper tubing has made VIKING the preferred thin-wall tubing for an ever-growing list of America's leading manufacturers of air conditioning and refrigeration units and coils.

VIKING copper tubing continues to be the result of the combined efforts of skilled craftsmen seeking always to create a tubing that will do the job better, faster and at lowest cost!

VIKING COPPER TUBE CO.
CLEVELAND 10, OHIO

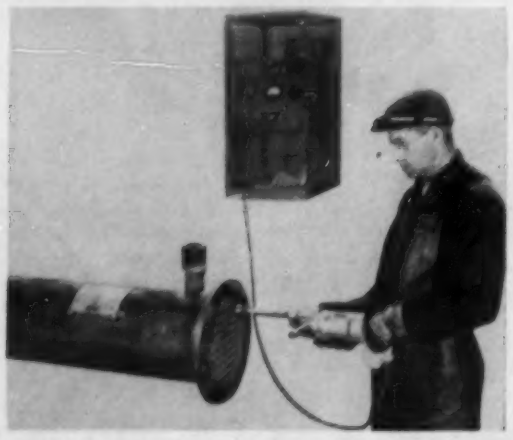
PRECISION DRAWN SEAMLESS COPPER TUBING

EXTRA STRENGTH
The proper kind of strength and ductility is vital in tubing used for refrigeration and air conditioning purposes. VIKING copper tubing possesses these properties to a far greater degree than other types of tubing. Its temper assures flawless fabrication.

EXTRA FLEXIBILITY
Viking Copper Tube is soft and pliable, yet exceedingly rugged. It saves time and labor because it can be coiled, formed, flared and expanded quickly without danger of fracturing or splitting.

ELECTRONIC QUALITY CONTROL
An electronic "Brain" detects the minutest flaw or imperfection in the walls of VIKING tubing . . . automatically discarding defective tubing. Trouble-free fabrication is virtually guaranteed — operational failures almost completely eliminated.

# New Plant and Interchangeable Components Speed Acme 'Standard,' 'Custom Built' Lines



ELECTRONIC tube roller used by Acme on all "Dry-Ex" liquid chillers and shell and tube condensers to roller expand the tubes into the tube sheets at each end of the units. This is said to assure positive leak-proof joints since under and over-rolling are eliminated.

JACKSON, Mich.—One of the surest signs of increased activity and production in the air conditioning field is to be found not only in tables, graphs, charts, and published data, but also in Jackson, Mich.—in the form of the new plant now under construction for Acme Industries.

The second section, due for completion early in the fall, will provide additional production and warehousing space of approximately 120,000 sq. ft. Eventually, this modern, single-story building will encompass more than half a million square feet of factory and office space.

Situated on a 55-acre plot on the outskirts of Jackson, it will embody advanced features of factory architecture, including a minimum of glass area, modern lighting, and basic structural elements designed for permanency and ease of maintenance.

Acme officials, due to rapidly increasing demand for its products (last year it was 35% ahead of the year before), were faced with the problem of providing sufficient facilities for keeping up with demand for its equipment.

### *Decide New Plant Would Be Best Bet*

Before making the decision to build the new facilities, company officials weighed all the pros and cons; decided that a new plant would be their best bet. They felt that the new plant would permit them to build quality products faster, more efficiently, and more economically. It would also permit them to continue to build quality merchandise at a competitive price.

One of the major problems they were faced with was that of providing production area for new and improved models that were already on the drawing boards, and for models that will be designed to meet the ever increasing demand.

By building a new plant, Acme officials have been able to completely eliminate the costly and inefficient process of "building around" certain set machines or production and testing areas, so often the case when a manufacturer modernizes or expands existing facilities. Also, by assigning particular models and styles to the new plant, others to the present plant, it has been possible to improve, to an enormous degree, the flow of production in both.

Complete advance production planning is going into the new plant, based on the know-how Acme has gained over the years. Individual lines are being planned to follow a specific order of construction and erection.

For instance, the company has found that certain sections or components are built best, fastest, and most economically by permitting a single team of workers to carry through to final assembly. Other components, they have found, are built best by following a production-line technique where each phase of erection is handled at individual work stations.

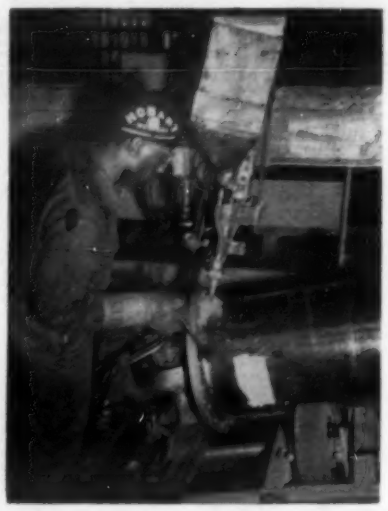
To further add to efficiency, it will also be possible, now, to standardize production techniques into definite areas, reducing as much as possible expensive and cost-increasing materials-handling between plants and work stations.

### *Much Equipment Built For Specific Purpose*

A major production problem at Acme Industries is found in the fact that a large share of its equipment is sold as custom-built units designed for a specific purpose. However, the engineering department has discovered that most of the special units can be built up using standard components.

Therefore, all equipment is being built to permit interchangeability of these parts to achieve the desired results. Primary thinking along these lines has been to establish a definite procedure of design.

At the present time, Acme finds, the use of four different sizes and styles of each of the basic evaporative condenser and cooling tower components—sumps, coil or deck middle sections, and fan sections—can be used to fill the vast majority of its orders. Therefore, a great emphasis is being placed upon the installation of special jigging equipment that will make it possible to quickly and simply combine the components due to improved alignment of connec-



THREE automatic girth welders were developed and built by Acme for welding tube sheets to shells on all liquid chillers and shell and tube condensers. This method is claimed to be much faster than hand operation, results in a better weld and lower unit cost.

improved connector alignment.

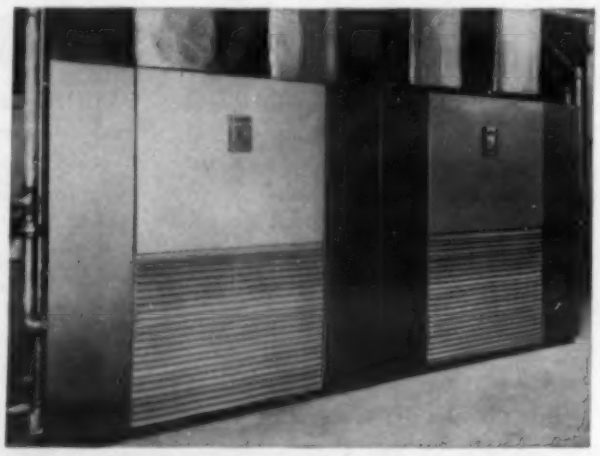
Equipment installed in the

*(Concluded on next page)*


# How to air condition a shopping

LEFT: Park & Shop supermarket in Dixie Manor Shopping Center, Louisville, Ky., is said to be the largest in the United States. Its 46,000-sq.-ft. area is 100% air conditioned by six 15-ton G.E. package units.

ABOVE: Six remotely located 15-ton G.E. package units deliver conditioned air to wall and ceiling diffusers throughout the Park & Shop store. Store area is divided into zones, each served by its own unit. Units have two-stage modulated cooling combining with the zone system to provide an extremely flexible installation.



ABOVE: Shows partial installation of remotely located package units which connect to wall and ceiling diffusers in the store. Gas-fired furnaces connect with the same ductwork to deliver warm air for winter heating. In using package units the builders found that no special equipment rooms were needed and very little floor space was lost.

## "Freon-22"* in individual installations of from 3 to 142½ tons cools 70 stores at Dixie Manor Shopping Center, Louisville, Ky.

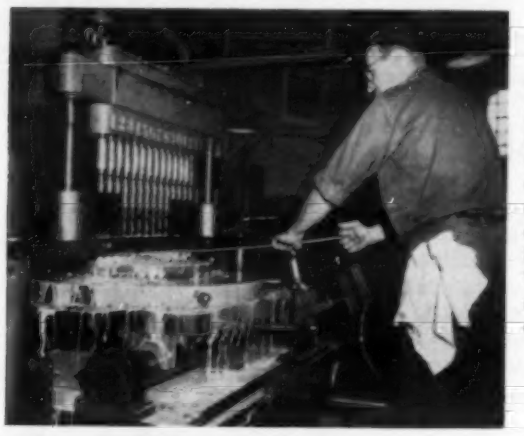
Carefully integrated planning—from selecting the site to including air conditioning in each store—adds up to beauty, convenience and comfort for shoppers at Dixie Manor Shopping Center, Louisville, Ky. Each of the 70 stores is fully air conditioned with individual installations of General Electric package units.

Smallest installation takes only 3 tons while the largest utilizes 9 15-ton units and one 7½-ton unit to air condition 60,000 sq. ft. of space. Ward Refrigeration & Engineering Co. installed all the mechanical and air conditioning equipment. By standardizing on one supplier and contractor, the shopping center management feels it has

EXPERIENCE HAS




*For more information about products advertised on this page use Information Center, page 34.*



THIS IS a 14-spindle multiple spindle drill used to drill tube holes in tube sheets for liquid chillers and shell and tube condensers. It enables the operator to drill several holes in each operation. This machine will be installed beside the 20-spindle multiple spindle drill in the new plant.

# *New Plant Equipment--*

*(Concluded from preceding page)* new plant is designed to provide improved production. It will be combined with equipment that has already proved to be superior in the old plant for construction of good air conditioning units and components.

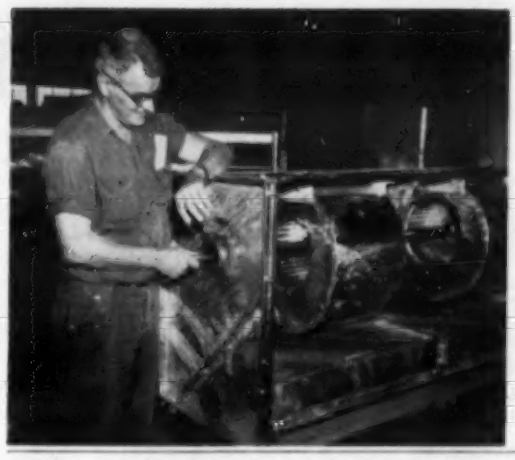
Some of the more important of these are: an electronic tube roller that automatically controls proper fit of copper tubes; special washing and drying equipment; use of automatic stud welders; improved shot-blast equipment; new dry-filter paint booths; special Acme-modified girth and seam welding equipment; and a large multiple-spindle drill press.

The automatic shot blasting equipment made by Pangborn Corp. is used in two ways—to clean out shells and condenser and chiller heads. In operation, the operator places the shell on a carriage which travels on a narrow gauge track into the blasting area. From the opposite end of this area is a traveling carriage with a lance type nozzle that enters the rotating shell at the proper angle to blast away all dirt and scale from the inside of the shell.

This new equipment will permit the operator to shot blast approximately 3 shells in the time now required to do one with the manual equipment. It will also automatically return the shot to hopper which now has to be done by shovel in the existing equipment.

A new automatic Roto-blast shot blaster for cleaning condenser and chiller heads is also being installed in the new plant.

The new residential packaged chiller production line which will be completed this fall will provide four times the facilities now being used and will permit assembling units at a rate 20 times greater than present facilities.



EACH evaporative condenser and cooling tower fan section is given a complete check to assure proper rotation, fan and fan shaft balance, fan speed, proper fan wheel clearance, and freedom from vibration. This man is using a tachometer to check fan speed.

This will be a complete line, starting at one end in the complete assembly of components, then leak detecting with a mass spectrometer, a complete operating test, snifter leak detector test, painting, coating, and shipping.

### *Wide Variety of Test Procedures Outlined*

A wide variety of test procedures are employed at Acme to assure that the completed products go to the field in as near-perfect condition as possible. Among these tests are:

(1) Mass spectrometer leak detecting in which a vacuum is pulled on the unit, which is then submersed in a helium atmosphere, the unit then being placed in the spectrometer apparatus. The presence of helium within the unit will then show up on the control panel, indicating a leak within the unit.

(2) Electronic "snifter" type leak detectors in atmosphere controlled rooms are also used by Acme for leak detection on larger units.

(3) Air-under-water leak detecting in compliance with ASME code requirements is also used by Acme on all shell-and-tube equipment in the pressure vessel category. This method eliminates the possibility of contaminating the system that might occur with other fluids.

(4) Every Acme complete refrigeration system is given a complete operating test at normal design working conditions prior to shipment to assure satisfactory load carrying and operating characteristics.

(5) Visual inspection of materials and workmanship both in line production and final assembly is a continuous process.

# center with package units

**RIGHT:** Ben Snyder Department Store occupies the greatest amount of space at Dixie Manor Shopping Center. Its 60,000-sq.-ft. area is fully air conditioned by nine 15-ton and one 7½-ton package units.

**ABOVE:** Ben Snyder's store area is divided into zones, each served by its own package unit. Special equipment rooms were not built, nor were return air ducts required for most of the stores in the shopping center.

**ABOVE:** Shows partial installation of the 142½ tons of remotely located package units used to air condition Ben Snyder's 60,000-sq.-ft. area. Connecting ductwork delivers conditioned air to wall and ceiling diffusers throughout the store. Gas-fired furnaces connect with this same duct system to supply heat in winter.

simplified its refrigeration service requirements.

Effectiveness of air conditioning for Dixie Manor is due in part to the charge of Du Pont "Freon"* refrigerants in the cooling systems. For any installation, no component of the cooling system is more important than the refrigerant used. That's why you should always use a "Freon" refrigerant for the air conditioning jobs you do. Du Pont's 25 years' experience manufacturing "Freon" is your assurance of unsurpassed quality and purity. "Freon" refrigerants are safe—nonflammable, nonexplosive, virtually nontoxic. Your wholesaler can promptly supply a "Freon" refrigerant for any size and type of air conditioning equipment.

**SEND FOR MORE INFORMATION** and technical data on uses of "Freon". Write to E. I. du Pont de Nemours & Co. (Inc.), "Kinetic" Chemicals Division 110, Wilmington 98, Delaware.

**NO COMPETITORS**

1931 KINETIC 1956

25 YEARS OF

FREON

SAFE REFRIGERANTS

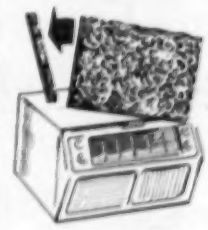
*"'Freon" is Du Pont's registered trademark for its fluorinated hydrocarbon refrigerants.*

DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

MASTER

EVERLAST - R.C. - FILTER



Cut to Fit Filter for all Room A.C. Units

• • •

- one size for all units
- just cut to fit
- flexible edges seal
- no leaks at edges
- efficient and long lasting
- wash to clean
- cuts easily with shears
- fits snuggly
- low inventory costs
- filtering media curled Karatin set in rubber
- packed in cellophane

LOW COST—DISCOUNT

MASTER PRODUCTS COMPANY

7000 S. Wentworth, Chicago, Ill.

## *Cranston To Head Lindemann&Hoverson Kyser To Be Gen. Mgr.*

MILWAUKEE — The election of William E. Cranston as president and Howard N. Kyser as vice president and general manager of A. J. Lindemann & Hoverson Co., 81-year-old appliance manufacturing company, was announced recently.

The election followed the resignation of Eugene A. Lindemann from the position of president and general manager of the firm to establish a management consulting firm.

*Air Conditioning Valve Developments*

# Design Helps To Up Performance, Ease Operation, Speed Production, Keep Flexibility, Hold Cost Low

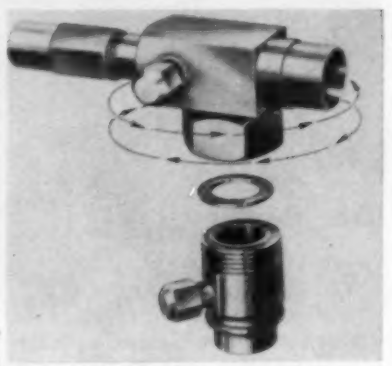
ADRIAN, Mich.—A problem of original equipment manufacturers using refrigeration systems is that of how to "valve" systems effectively to improve performance, simplify operation, expedite production, and keep field flexibility for component replacements, and yet keeping valve cost low, point out officials of Primore Sales, Inc. here.

The company, design and sales engineers, have brought forth several developments in valves designed specifically to meet the demands of the air conditioning industry. The valve products are produced by Automatic Machine Co., Attleboro, Mass.

### *'Break-Away' Base Mounted Valve Developed*

One development was a line of "break-away" type base mounted valves for remote air-cooled residential systems. These permit valving remote condensers or condensing units and evaporator-compressor sections or evaporators with complete control of those components and the use of pre-changed connection tubing.

In the field of compressor valves, Primore developed a line of detachable spud-mounted valves for hermetic compressors, and a flange valve for semi-hermetic or open-type compressors which incorporates a swivel feature on the valve.

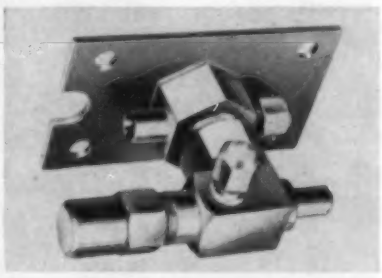


NEW MECHANICAL connector on the Primore compressor "break-away" spud-mounted valve permits the valve to be rotated a full 360° for easier connection.

### *Spud-Mounted Hermetic Compressor Valve Offered*

The spud-mounted hermetic compressor valve for both suction and discharge together with other adaptable design shut-off valves are aimed at giving the design engineer complete control of the system. The compressor valves feature a mechanical connector between valve and the spud mounted on the dome.

This design permits 360° rotation of the valve to place the tube connections at the most advantageous point, and allows quick field exchange of a hermetic compressor without unsoldering and re-soldering connecting lines, and without disturbing other components.

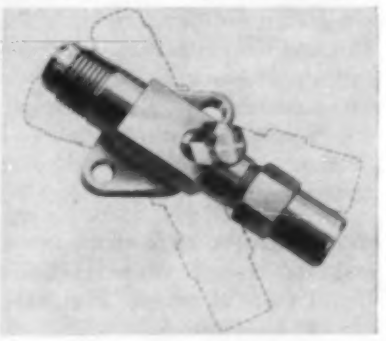


NEW ROTATING compressor "break-away" spud valve is also available with mounting bracket as illustrated here.

The new flange valves mount steel shut-off valves on conventional sized flanges, but the design permits the valve to swivel on the flange, giving a choice of angles at which the valve tube connectors are placed in relation to the flange.

### *Incorporates Feature In Tube Connector Line*

This same feature is incorporated in a line of tube connectors, either flare or solder type, mounted on conventional flange sizes where compressor valves are not required on semi-hermetic or open-type compressors.



SWIVEL FEATURE of automotive pad valve allows valve to be turned either left or right depending on need.

Exterior of Series 1272 single function control available for either low or high pressure.

Series 1273 dual pressure control. Lockout and manual reset available for either low or high pressure cut-out.

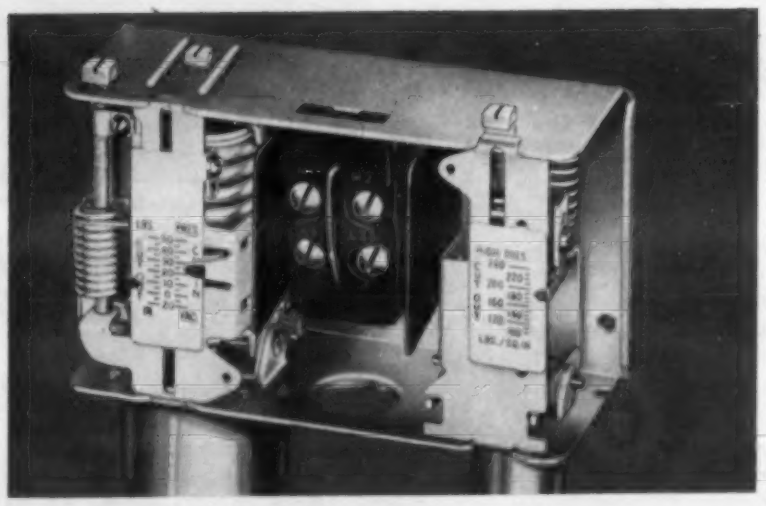
# PENN REFRIGERATION CONTROLS ELIMINATE MOTOR STARTERS

**Extra heavy duty Series 1272 and 1273 pressure controls have the highest rating in the industry!**

Specifically designed for commercial refrigeration and air conditioning jobs, the Series 1272 and 1273 are rated at 3 H.P. for single phase compressors and at 5 H.P. for polyphase compressors.

Thus, cost of contactor is eliminated if motor has built-in overload protection. If motor requires external overload protection, the motor starter can be replaced by the more economical "manual starter." So . . . in either case, these Penn controls *save you money!*

In addition, the Series 1272 single function and Series 1273 dual function controls meet the most modern maximum test requirements. And, there are features such as . . . self-cleaning, snap-acting contacts . . . direct-reading calibrated scale for simple cut-in and cut-out setting . . . and many more. So, don't settle for less. Get the full story from your wholesaler or compressor manufacturer.



Interior of Series 1273 illustrating sturdy contact block with easy-to-reach wiring terminals.

**PENN CONTROLS, INC.** Goshen, Indiana

AUTOMATIC CONTROLS FOR HEATING, REFRIGERATION, AIR CONDITIONING, GAS APPLIANCES, PUMPS, AIR COMPRESSORS, ENGINES




*For more information about products advertised on this page use Information Center, page 34.*

## Jewel Tea To Expand Market Area; Now Has 183 Stores Around Chicago

CHICAGO—Plans to expand the area served by Jewel Tea Co.'s stores to include all cities within a radius of 100 miles were announced recently by George L. Clements, president of the firm.

Surveys for new sites will begin at once.

The company now has 183 food stores located within 50 miles of its Chicago servicing headquarters.

Twelve new supermarkets have been opened so far this year by Jewel. It has 39 more under commitment, lease, or construction.

Another 35 or 40 supermarkets are planned for 1956, including the first stores in the new Jewel territory.

### Marshall Is Barnebey Sales Representative

COLUMBUS, Ohio — R. D. Marshall of R. D. Marshall and Co., Inc., Albany, N. Y., has been appointed sales representative for "PurAir" activated charcoal air purification equipment throughout upstate eastern New York, southern Vermont, and western Massachusetts, according to H. L. Barnebey, vice president of the Barnebey-Cheney Co.

## Central Cooling Extension Service Course Planned

LOS ANGELES—An extension service course planned to help contractors and their salesmen will again be taught this school year by Howard N. Helfman, consulting engineer, to cover the field of "Central System Air Conditioning Design."

Last year the classes were held at University of California extension service quarters in downtown Los Angeles.

This year the classes will be held at the University of California at Los Angeles.

### Gets Cooling Contract

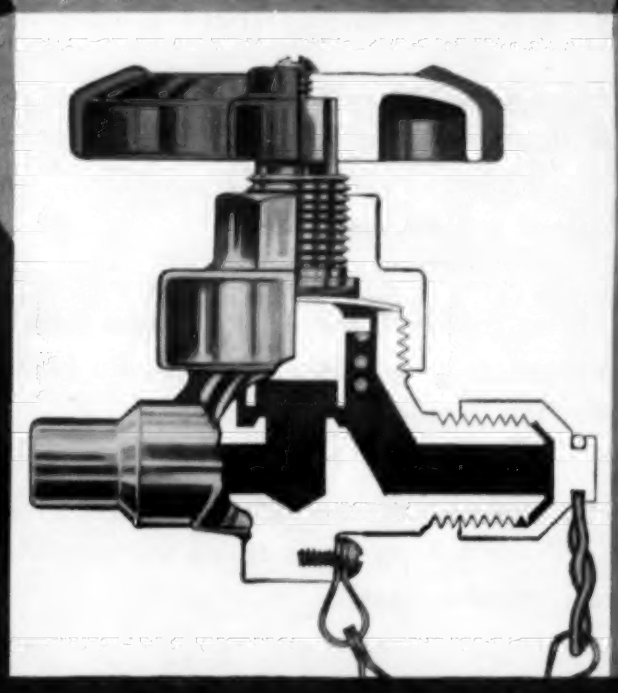
WOODRUFF, S. C. — Greenville Air Conditioning Co. of Greenville has been awarded a contract for the installation of air conditioning in the new 14-room Medical building being constructed on East Georgia St.


*good things come in small packages*

NEW!

NEW *the* KEROJET

THE KEROJET
CHARGE, PURGE AND DRAIN VALVE
MODEL R224X1



COSTS LESS

*Features*

- Full open height only 2¼"
- Rugged brass forged body with integral mounting flange
- 2½" cast aluminum handwheel, colored for easy identification
- Seal cap attached with chain
- Beryllium Copper and Stainless Steel diaphragms offer maximum resistance to wear

The Kerojet R224X1 is a new and improved Charge, Purge and Drain Valve, precision designed for refrigeration and air-conditioning systems. Available with ¾" solder type inlet and ⅜" S.A.E. male flare outlet. Maximum operating pressure 500 p.s.i. and temperature 200° Fahrenheit. See your Kerotest wholesaler today.

KEROTEST

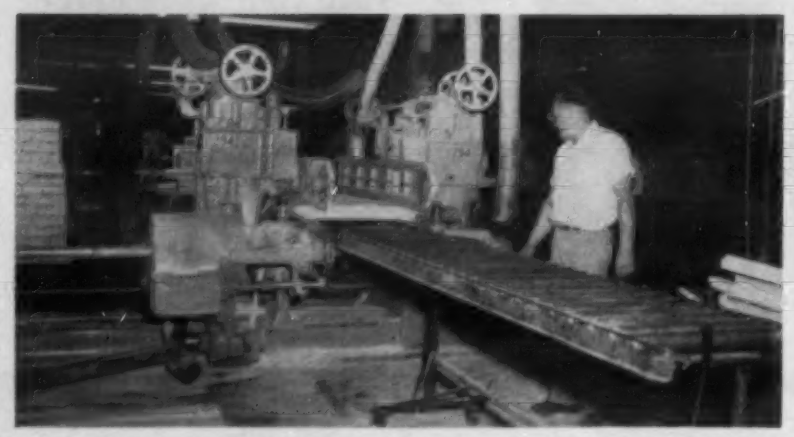
2525 LIBERTY AVENUE · PITTSBURGH 22, PA.

# No Mold, Little Tooling Needed To Produce All-Plastic Refrigerator Cabinet

## *Wood-Working Saws, High Frequency Heat Only Tooling Used*

GRAND RAPIDS, Mich.—Long talked about but held back chiefly by excessive mold costs, the all-plastic refrigerator cabinet now appears to be a practical reality.

No mold is involved, and very little tooling either, in the unique process devised and now being used by Haskelite Mfg. Corp. here. Only tooling needed, in fact, is comparatively inexpensive wood-working machinery plus high frequency heating equipment.



INITIAL production step of plastic refrigerator cabinet is to rabbet sides of "sandwich" panel on power saw.

PANEL is mitered and grooved so it can be folded up to form cabinet.

### *'$100,000 Should Cover Major Line Tooling Cost'*

Cost of tooling up jigs and fixtures for such a plastic cabinet shouldn't exceed $40,000 for a single model at the outside, estimates Arthur Williams, Haskelite president, compared with the $600,000 or more usually required for the conventional steel refrigerator cabinet design. And $100,000 would more than cover a major line, Williams says.

Besides the advantage of reduced tooling cost, the time involved should be less than 30 days initially, and shifting the line from one model to another can be done in three hours, according to Haskelite.

### *Believes Production Labor Costs Can Be Cut to 50%*

Production labor costs can be reduced also, perhaps as much as 50%, believes J. A. Potchen, vice president in charge of engineering and research, who primarily developed the new cabinet process.

What Haskelite does, essentially, is prepare a length of its "Hasko-Struct" laminated structural insulation, cut mitered joints almost through the "board," fold the four sides up into a shell, and attach the back (for a built-in refrigerater). Doors are hung and refrigeration system installed later.

There are more steps than this in actual production, of course, but not so many more as one might think.

### *Product Is Light, Strong, Almost Impervious to Moisture*

Resultant product is lighter in weight than a steel cabinet, has greater structural strength, and the insulation used is virtually non-permeable to moisture, the company says.

Haskelite is in actual production of a built-in refrigerator cabinet for one manufacturer. Other manufacturers are said to be seriously considering this approach for wall and upright cabinets.

However, Haskelite itself is not primarily interested in manufacturing the cabinets. Instead, it prefers to supply its Hasko-Struct panels to refrigerator and freezer companies who will produce the cabinets in their own plants.

Haskelite's specialty is the design and production of laminated "sandwich" panels. It pioneered plywood for aircraft, for example, and still proudly recalls that its plywood was employed in the construction of Lindbergh's plane, the *Spirit of St. Louis*.

The Hasko-Struct structural insulation used for refrigerator cabinets basically consists of a core of expanded polystyrene insulation board such as Styro-

*(Continued on next page)*


ROTARY SEAL

**Replacement Units**

*Available in a wide size range for Commercial, Semi-Commercial, Air Conditioning and Home Refrigerators.*

EASY TO INSTALL ★ ECONOMICAL

AT ALL LEADING JOBBERS

2026 NORTH LARRABEE STREET
CHICAGO 14, ILLINOIS, U.S.A.



# For their toughest tubing problems ...Tecumseh relies on Bundyweld

**Here's why! Only Bundy® offers these 4 big advantages:**

**1** A double-walled steel tubing (made from a single metal strip) for the utmost in strength, durability, and leakproof performance.

**2** Practical engineering assistance from our topflight refrigeration engineers . . . men who know tubing and production problems inside out.

**3** Complete, modern fabrication facilities for turning out difficult tubing parts to exact specifications, at the lowest possible cost.

**4** Dependable, *on-time* delivery of clean, carefully inspected Bundyweld Tubing in the specified lengths and sizes.

Whatever *your* tubing problem — evaporators, condensers, compressors, or other refrigeration lines — you, too, will find it pays to use Bundyweld Tubing and Bundy's skilled engineering and fabrication help.

Closer tolerances, fewer rejects, smoother production *begin* the Bundyweld payoff. Longer life and better performance in your product complete it.

For detailed information and expert assistance with your tubing and fabrication problems, phone, wire, or write us, today!

BUNDY TUBING COMPANY • DETROIT 14, MICHIGAN

BUNDYWELD IS DOUBLE-WALLED FROM A SINGLE STRIP

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

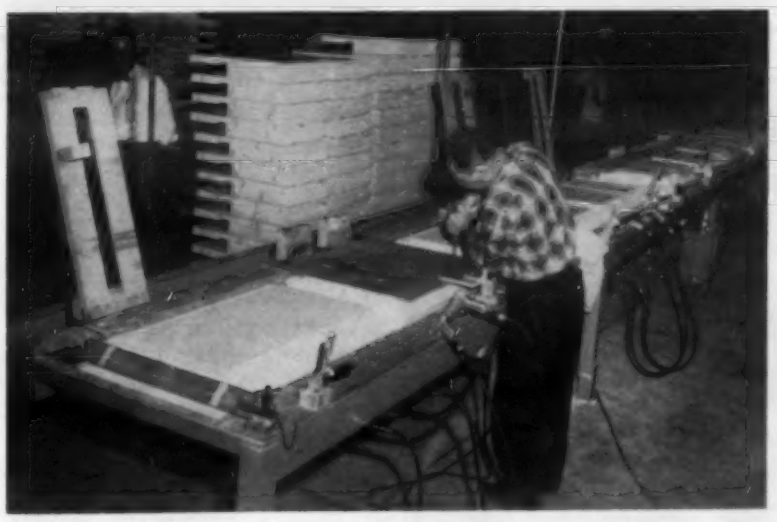
passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

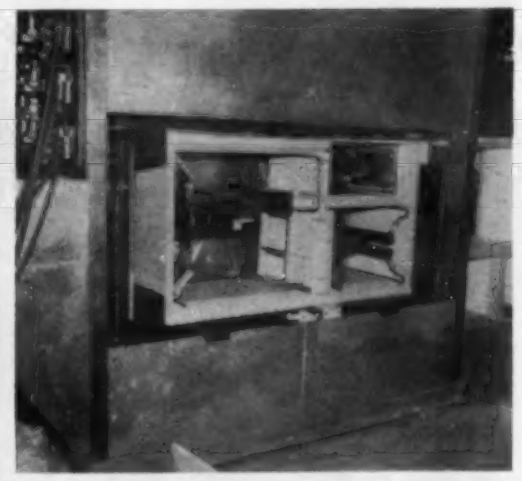
NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.




*For more information about products advertised on this page use Information Center, page 34.*



TEMPLATES locate holes in panel which are drilled for shelf brackets, etc.



HIGH frequency oven for curing cement which bonds mitered corners of cabinet when folded up is most expensive item of tooling—about $11,000.

BREAKER strip, of plastic, is simply cemented in place.

## *Producing All-Plastic Cabinets– –*

*(Continued from preceding page)*

foam which is faced on one or both sides with a polyester-impregnated Fiberglas cloth.

Standard Hasko-Struct panel is available in 48-in. widths and lengths of 96, 120, or 144 in., and thicknesses of 1, 2, 3, 4, or 6 in. Insulation can be of 2 or 4½-lb. density, and the cloth facing .018 or .032 in. thick.

Alternate composition of the basic insulating panel, however, is almost unlimited in variety. The face(s) could be stainless steel, porcelain steel, zinc coated steel, aluminum, magnesium, expanded plastic, plywood, fiberboard, etc.

For special applications the sandwich panel can have an additional filling or "interband" of plywood, say, between the core and face to gain added strength or achieve some other desired property.

Strength-to-weight ratio of even the basic panel is quite high, the company points out. Its construction can be compared to a steel I-beam, with the insulation core functioning as the web of the I-beam and the facing sheets as the flanges.

Although use of the structural insulation board for refrigerator cabinets is new, the panel already has a successful application record in refrigerated truck and trailer bodies, according to Haskelite officials. Many other applications are possible also, the company believes, including site-assembled walk-in coolers, freezer rooms, etc.

Basic sandwich panel now being employed at the Haskelite plant for the wall refrigerator cabinet in production there is the all-plastic panel consisting of 3-in. thick 2-lb. Styrofoam with an .032-in. thick polyester impregnated Fiberglas cloth on one side.

### *Wood-Working Saws Cut Basic Panel To Size, Shape*

Initial cabinet production steps involve sawing the basic panel to proper outside dimensions and shape, cutting out miters so the panel can be folded to form four sides, and mortising for dividers.

Precision wood-working saws are employed for this purpose. Although Haskelite is presently using individual power saws to make the miter and mortise cuts, production officials point out that the saws could be set up quite simply in an A-frame and all these cuts made at once.

### *Bond Plastic Sheets To Panel, Cut Holes*

In following steps the plastic sheets which serve as the inner lining of the cabinet are bonded to the panel, and holes necessary for shelving mounts, etc., are drilled.

No special cutting tools or drills are required for working the sandwich panel, the company explains.

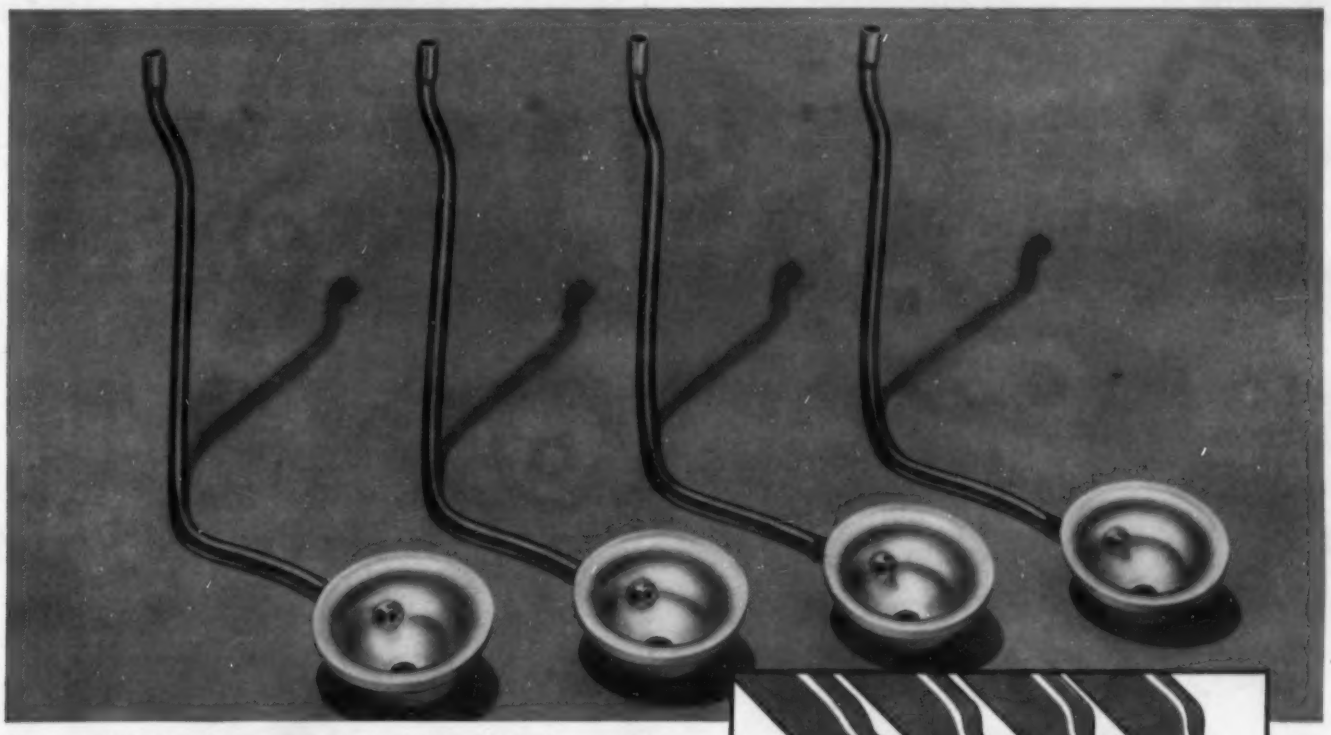
Wood or metal batten strips are cemented in position as needed for attachment of door hinges and the like.

Next major step is to fold up the prepared panel along the mitered joints to form the four sides of the cabinet (after applying the bonding cement, of course), insert the dividers, and place it in an "oven" where it is clamped in position and the bonding cement is "cured" in a few minutes by high frequency heating.

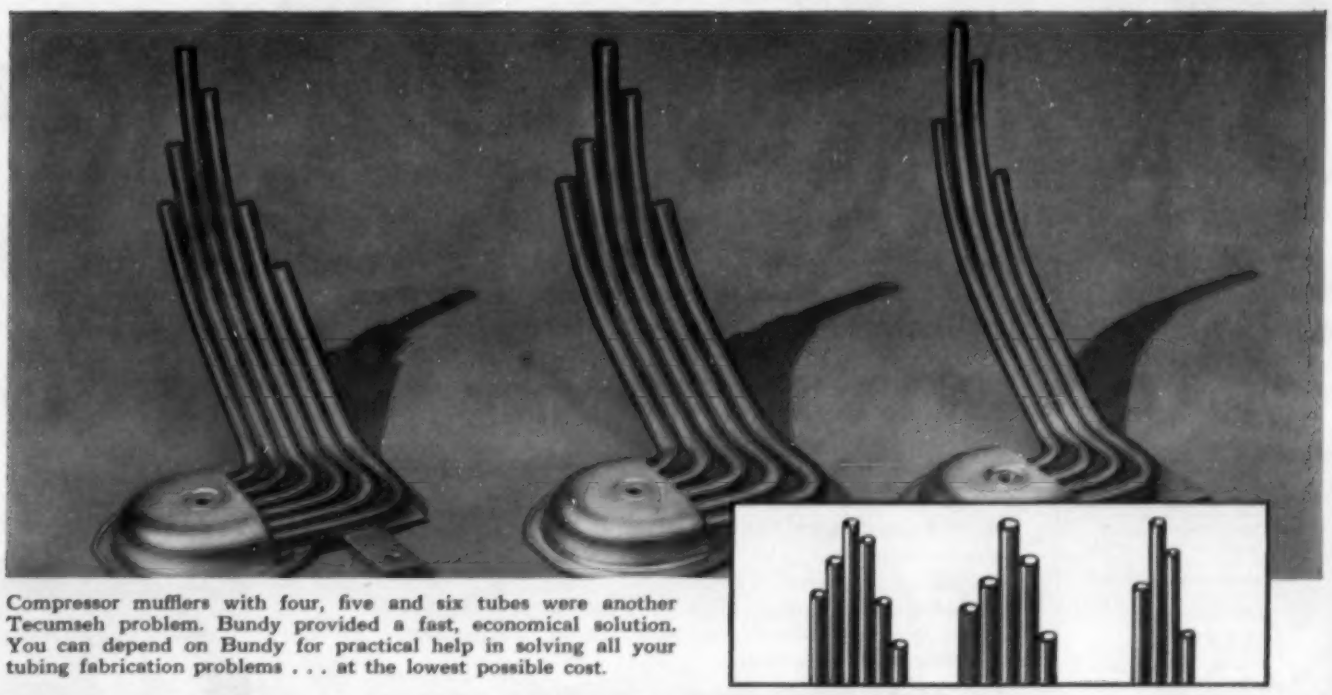
The high frequency "oven" is the most expensive item of tooling required in the entire production line. Initial cost of such an oven is around $11,000, according to Haskelite.

High frequency heating is also used to cure the cement with which the molded plastic

*(Concluded on next page)*


Tecumseh Products Company had this tubing fabrication problem: how to swage different sized close-tolerance orifices in these muffler tubes . . . all from ¼" tubing. Flexible Bundyweld Tubing and skilled Bundy engineering quickly solved the problem.



Compressor mufflers with four, five and six tubes were another Tecumseh problem. Bundy provided a fast, economical solution. You can depend on Bundy for practical help in solving all your tubing fabrication problems . . . at the lowest possible cost.

**BUNDYWELD® TUBING**

**Bundy Tubing Distributors and Representatives:** *Cambridge 42, Mass.:* Austin-Hastings Co., Inc., 226 Binney St. • *Chattanooga 2, Tenn.:* Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • *Chicago 32, Ill.:* Lapham-Hickey Co., 3333 W. 47th Place • *Elizabeth, New Jersey:* A. B. Murray Co., Inc., Post Office Box 476 • *Los Angeles 58, Calif.:* Tubesales, 5400 Alcoa Ave. • *Philadelphia 3, Penn.:* Ruton & Co., 1717 Sansom St. • *San Francisco 10, Calif.:* Pacific Metals Co., Ltd., 3100 19th St. • *Seattle 4, Wash.:* Eagle Metals Co., 4753 First Ave., South *Toronto 5, Ontario, Canada:* Alloy Metal Sales, Ltd., 181 Fleet St., E. • **Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.**

**WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, ENGLAND, FRANCE, GERMANY, AND ITALY**

# Steps In All-Plastic Refrigerator Cabinet Production

INDUCTION HEATING is also employed to bond breaker strip to cabinet.

FINAL operation at Haskelite plant is to clean cabinet and wipe off excess cement.

*(Concluded from preceding page)*

breaker strip (impregnated with Fiberglas) is attached to the cabinet. A good bond is made here, but there's nowhere near the problem of keeping moisture out of the expanded polystyrene insulation as with conventional design, Haskelite says.

In the meantime, the back of the refrigerator cabinet is being produced in a second line. Back is made from a laminated plastic panel which has plywood reinforcing and mounting plates. A certain amount of routing and drilling is required.

Back is attached to cabinet shell with cement and screws. Final step is chiefly that of cleaning the cabinet to remove excess bonding cement. Haskelite does not install the doors for the wall model in current production at its own plant.

Such doors, however, could readily be made from Hasko-Struct panels, and would present no special problems in construction or mounting.

Completed cabinet, less doors, shelves, and refrigeration cycle, weighs just under 60 lbs. This is a 13-cu. ft. model.

"U" factor of the finished cabinet is figured by Haskelite as essentially the same as the "K" factor of the insulation. For the Styrofoam 33 employed here, "K" factor is .24 per in.

Haskelite's unconventional approach to refrigerator cabinet design and production is much more apparent in the plant than in the finished product. The visitor sees no sheet metal shears or breaks, and no stamping presses. Missing are the sparks and noise of seam and spot welders, and metal grinders and finishers, and the smell of hot metal. And the visitor looks in vain for paint spray booths, bake ovens, and porcelain enamel equipment.

Instead, there's an array of power saws, drills, and routers plus the silent high frequency curing ovens, and workmen with coffee cans of bonding cement and brushes.

BACK of the cabinet, made on separate line, has reinforcing, and is drilled and routed for attaching of refrigeration cycle.

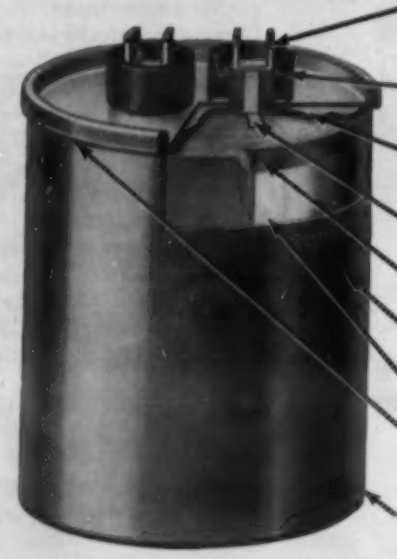
CEMENT and screws bond back to cabinet.

Full range of General Electric capacitors enables you to meet all power-factor requirements for all room conditioners

## TAKE YOUR CHOICE OF G-E CAPACITORS,

### designed and rated for next season's air conditioners

**10 REASONS FOR USING G-E AIR CONDITIONING CAPACITORS**



1. **QUICK-CONNECT TERMINALS**, single or double-blade type as well as fork type, are available.
2. **PHENOLIC CUPS** with silicone bushings increase creepage distance.
3. **BROAD UNDERCOVER INSULATION** increases internal electrical creep distance.
4. **AUTOMATIC TAP INSERTION** assures correct positioning.
5. **LOW-LOSS KRAFT PAPER** assures long life, high performance.
6. **AUTOMATIC FACTORY TESTING** assures reliability of rating.
7. **ALUMINUM FOIL** of high purity assures uniform quality.
8. **DOUBLE ROLL SEAM** assures leak-proof cases even under severe operating conditions.
9. **DRAWN SEAMLESS CASE** eliminates possibility of seam leaks.
10. **PYRANOL IMPREGNATION** makes possible minimum size, highest quality capacitor for a given rating.

**NOW YOU CAN GET** the capacitor that is exactly right for your latest model air conditioner. No matter what rating you are building for next season, there is a newly designed General Electric Pyranol* capacitor ready for you.

**OUR ENGINEERS HAVE DESIGNED** higher rated capacitors at minimum increases in case height to help you meet your critical space requirements. This valuable space in room coolers has been saved by increasing capacitor ratings without increasing capacitor base dimensions.

**GENERAL ELECTRIC CAPACITORS** can also help you meet the new Underwriters' Laboratory running current limitations, and utility power-factor requirements. Your G-E Sales Engineer has the training and experience to help you solve these special problems concerning power factor and optimum capacitor space utilization.

**JUST CONTACT YOUR LOCAL** General Electric Apparatus Sales Office. Or write for Bulletin GEA-5895, "Capacitors for Air Conditioning Equipment," to the General Electric Company, Section 442-31, Schenectady 5, New York.

*Registered trade-mark of the General Electric Co.

*Progress Is Our Most Important Product*

GENERAL ELECTRIC




*For more information about products advertised on this page use Information Center, page 34.*

## Large Inventory of 'Stock' Items Speeds Shipments

CHICAGO — "We need some fast deliveries . . . our lines are down." These are familiar cries heard by firms supplying parts to an original equipment manufacturer, according to officials of Wabash Corp. here.

One way in which Wabash Corp. here has supplied an answer to this problem, in terms of driers, strainers, accumulators, and capillary tubing it supplies, is to have substantial inventory of "stock" items which are either identical with the specialized production parts used by the original equipment manufacturer, or so close that they can be substituted with little or no interruption of a production run, company spokesmen stated.

SHIPPING room fills rush order from inventory of "stock" items which is maintained by Wabash Corp. to help customers keep production lines running.

This also makes it possible for the original equipment manufacturer to give the supplier an estimate on his year's requirements, but to actually take delivery only as he needs the parts to keep his lines going, and thus cut down on his own inventory problem, say Wabash officials.

An example of how this works is in the orders placed by Typhoon Air Conditioning Co., which uses a series of Wabash strainers ranging from 3/8 in. o.d. solder to 7/8 in. o.d. solder connections. These strainers are used on Typhoon's line of air conditioners as added protection for the controls and compressors.

As is common practice with most larger manufacturers, Typhoon places orders for their estimated year's requirements and then "releases" parts of this estimate as production is set. In the instance of orders placed for strainers, Wabash has been able to make immediate shipment from its stock on at least a portion of each "release" since the strainer is produced as a "stock" item, it was pointed out.

## *Norco Plans To Import 1½-Cu. Ft. Refrigerator, Heater from Europe*

LOS ANGELES—Norman H. Lee, president of Norco Sales Corp., Los Angeles, is on a business trip to England, Denmark, and West Germany where he will visit the Vaillant and Krefft factories to finalize arrangements for the introduction of 1957 appliance models to the trailer, boating, and LP-Gas markets here soon.

Among the new models will be a 1½-cu. ft. refrigerator, to augment the 3 and 4-cu. ft. models now in the Norco line of convertible refrigerators which operate on either LP-Gas or electricity.

Lee also plans to arrange for the importing of Vaillant room heaters "since the Vaillant water heaters introduced to the market this year have been accorded public acceptance."

## Philco Separates Ad, Sales Promotion Dept. Due to Product Growth

PHILADELPHIA — Philco Corp. has announced the formation of separate departments to handle sales promotion and advertising.

The growth of Philco's consumer product lines and expansion into new fields made it necessary to separate these functions in order to increase activities throughout the company's national distribution organization, according to John M. Otter, Philco's executive vice president.

Raymond B. George, formerly vice president - merchandising, was named vice president-sales promotion.

Max Enelow, formerly advertising counsel for Philco, was named advertising manager, it was disclosed.


# BOHN offers the only COMPLETE LINE of ALUMINUM "LOW-SIDE" PRODUCTS

BONDED-SHEET EVAPORATORS

TUBE-ON-SHEET EVAPORATORS

Production quantities of both types are being produced by Bohn for the country's leading refrigerator manufacturers. Whatever your evaporator problems, it will pay you to take advantage of Bohn's experience and complete engineering service.

SPECIAL TUBULAR HEAT TRANSFER PRODUCTS

Bohn engineering assistance and wide experience are available for application problems.

ALUMINUM FIN AND COPPER TUBE EVAPORATORS

Presently being supplied to the industry, combine high efficiency with lower cost.

MISCELLANEOUS PARTS

Simple or complex Bohn high quality aluminum accumulators are uniformly produced at lowest possible cost. Every Bohn connector double-checked for perfection.

MULTIPLE FREEZER SHELVES*

Shipped as shown. No joining or further processing required. Simply open out and install. Bohn triangular aluminum tubing gives shelves greater rigidity and primary freezing surface.

TUBE-ON-SHEET FREEZER SHELVES

Bohn freezer plates made with seamless aluminum tubing freeze food faster at less cost, provide uniformly low temperature throughout freezer.

COILED TUBING

Bohn aluminum tubing is available complete with copper brazing spuds. You can save as much as 5c to 29c per foot by switching from copper to aluminum.

*Patent Applied For

FREEZER PLATES
UNIT COOLERS
EVAPORATORS
CONNECTORS
TUBING
COILS

BOHN

For the *only* complete line of refrigeration products and for complete engineering service . . . look to Bohn . . . the one manufacturer who has more experience than any other in the aluminum "low side" product field.

**ALUMINUM AND BRASS CORPORATION**
DETROIT 26, MICHIGAN

SALES OFFICES: *Boston • Chicago • Cleveland • Dayton • Detroit • Indianapolis Milwaukee • Minneapolis • Moline • New York • Philadelphia • Rochester • St. Louis*


*For more information about products advertised on this page use Information Center, page 84.*

# Overhead Conveyor System Allows Centralized Air Conditioner Crating

LEFT: One of two "lowerators" operating in the Airtemp centralized crating section. Both carry units from the overhead conveyors to ground-level crating lines. One lowerator handles room air conditioners and furnaces, the other air and water-cooled packaged air conditioners.

A SECTION of the overhead conveyor that carries air and water-cooled package units to the crating center. When the new handling system was first added, this portion of Airtemp's main building No. 40 was released for material storage. This same section is now the site of the firm's new $1½ million machine line.

ELEVATOR in action at Airtemp. A water-cooled packaged unit is being hoisted to the overhead conveyor while two air-cooled condensers (held by photo-electric cell) await their turn.

DAYTON — Instituting an overhead conveyor system to carry air conditioners from final assembly to a centralized crating area has provided room for a new $1.5 million machine line in the main plant building of Airtemp Div., Chrysler Corp.

Before the overhead conveyor system was installed, Airtemp air and water-cooled packaged units and car air conditioners were tested and crated while still on the assembly line.

Then they were picked up singly by fork trucks and carried to the company's warehouse and shipping section located in an adjacent building.

### *Old System Required Much Space To Store Crating*

With packaging being done at the end of the unit assembly line, considerable factory space had to be allocated to the storage of bulky crating materials. The materials had to be transported to, stored, and inventoried at six different sites. (Six sites, counting three additional assembly lines—for room air conditioners and furnaces—located in another building.)

Likewise, each line had to have its own set of materials and its own crating crew. Serving but one group of products, an entire line crew was idled whenever a line had to be temporarily halted for an adjustment or model change.

A problem too was jitney traffic which was heavy and hazardous in the assembly departments where the trucks picked up hundreds of completed units every hour.

### *New System Carries Units From 6 Lines to One Area*

Today, automatic conveyors (rather than fork trucks) now carry assembled "packaged" air conditioners, room air conditioners, and furnaces from six assembly lines to one centralized crating area.

Their flow controlled throughout by photo electric cells, finished products, as they reach the assembly-line end, move on to an elevator. They are raised to the overhead conveyor which carries them to the crating area.

Results of the improved handling have been multifold.

With the centralization of crating operations product assembly lines have been extended (permitting increased production) and product testing areas enlarged.

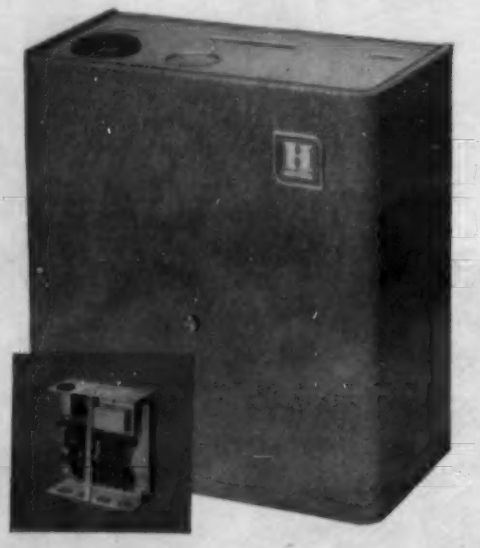
Crating material inventory control has been simplified and a saving effected by eliminating the expense of moving the stock to several different locations.

Heavy fork truck traffic has been removed from product assembly areas and the amount of traffic reduced substantially throughout other plant areas.

Going from fork trucks to automatic overhead conveyors, made a large amount of floor space (previously set aside for truck travel) available for production use. One section Airtemp has now filled with its new 1½ million-dollar compressor-body machining facility.


# A HONEYWELL CONTROL PANEL

*They're easier to install . . . more dependable.*
*And you get greater consumer satisfaction*
*because you offer Custom Air Conditioning*



**For applications up to 2 h. p. air conditioning systems— the *new* W402 panel**

The W402 is *custom control* designed to meet the needs of the new "Economy Two" type of packaged air conditioner that is sweeping the market.

The W402 contains tested Honeywell components. It is available in a number of models offering a variety of sequencing operations.

***Note These Features***

1. *Complete circuitry* allows you to "customize" your particular installation.
2. *Designed to contain three relays* which may be contactor, fan relay and heating relay, or any combination of these.
3. *Remote Control.* Fan relay permits fan operation from thermostat selection switch.
4. *Available with unmounted Hi-Lo Pressure Control.*
5. *Small*—7-3/16" high, 6⅜" wide, 3⅜" deep.
6. *Accessible.* All components on one sub-panel.
7. *Simplified wiring* permits factory wiring of heating-cooling circuit.

**For water-cooled and packaged air conditioning units— the W212—**

***Note these features:***

1) *Complete circuitry* allows you to "customize" your particular installation.

2) *Remote control.* Fan relay permits fan operation from thermostat selection switch.

3) *Available with or without Hi-Lo pressure control.*

4) *Compact*—8⅛" high, 7¼" or 9" wide (if pressure control is included), 4" deep.

5) *Accessible.* All components on one sub-panel.

6) *Simplified wiring* permits factory wiring of heating-cooling circuit.

**For full information** on the complete line of Honeywell Control Panels for air conditioning, call your local Honeywell office or write to Honeywell, Dept. AN-10-225, Minneapolis 8, Minnesota.




*For more information about products advertised on this page use Information Center, page 34.*

# Machine Controls 100% Quality on 18 Units per Hour on 2 Integral Motor Housing, Compressor Case Handlings

STAUNTON, Va. — The control of quality at the Westinghouse Air Conditioning Div. plant here is based on the premise that, "quality must be built into the product and cannot be inspected into it."

A huge transfer machine, the Cross Transfermatic, installed at a cost of a half million dollars, plays a major role in the automatic production facilities at the plant.

### *Machine Said To Have Paid For Itself In 13 Months*

The machine performs two handlings on the integral motor housing and case of the compressor and is tooled to produce 18 pieces per hour at 100% efficiency. The machine was installed in April, 1955, and has paid for itself by May of this year, division officials declare.

Operated by only two men, the transfer machine represents 300 hp. of installed capacity; yet the compressor blocks for use in air conditioners and heat pumps turned out each day represent 1,200 hp. of power-consuming equipment.

### *Automatic Operation Controlled by Small Pushbutton Station*

The Cross Machine control unit is used with the machine and provides maximum operating efficiency and proper tool facilities. The electrical control panel provides full interlocks for safety and protection of the machine and the operator. Automatic operation is controlled from a small pushbutton station located at the loading station. A master pushbutton station is used for setup work or when changing over the machine.

A total of 160 individual tools are applied to the machining of the compressor case as it makes two trips around the Cross automated tool—once in a horizontal position—once in a vertical position. Since the tools are pre-set to standard lengths in adjustable holders, replacement of a dull tool can be completed in as little as two minutes.

Operations using automatic methods and tools are also employed in other parts of the Staunton plant. The presses and brakes for forming the panels and frames of the air conditioning units are arranged so that the parts are processed operation to operation. Once the initial operation is started on a panel or a part of it, it is processed through the equipment to completion, including the spot welding operations required.

DESIGNED to machine 18 compressor forgings per hour at 100% efficiency is this Cross Transfermatic machine. There are a total of 160 individual tools applied to the machining of the compressor case as it makes two trips around this automated tool—once in a horizontal position, once vertical.

Production capacity of this line was set at 1,000 panels and 100 frames per eight hours. The largest of these panels is about 93 by 30 in. Rust-proofing and Bonderizing of the parts is done on a continuous belt conveyor line.

Small forgings and castings are machined in a series of operations, so that the parts flow to and from each machine with little or no handling between operations. Crank shafts are ground, finished, drilled, reamed, and tapped automatically. Connecting rods are bored, drilled, and reamed to tolerances of one-half of a thousandth in a special automatic time-cycle machine.

### *All Machine Parts Needed for Compressor Assembly On Overhead Conveyor*

All machine parts required for the assembly of the compressor are placed on the overhead conveyor in the machining section and travel through a washing, cleaning, and degreasing operation and are unloaded at the assembly thus eliminating the problem of handling these parts between machining processes.

Conveyors with a normal speed of 8 f.p.m. are arranged so that each may be operated independently, but will be automatically synchronized when operated together, regardless of speed setting. This is accomplished by using a common caterpillar single drive unit powered by a 2-hp., 1,200 r.p.m. motor through a mechanical belt type transmission.

## *Honeywell Names Wilson Vice Pres.*

MINNEAPOLIS — The election of K. L. Wilson as vice president of the Minneapolis-Honeywell Regulator Co. was announced recently by the firm.

K. L. Wilson

Wilson, a 25-year-man with the company, was formerly manager of the Residential Div., previously known as the Heating Control Div. The division, which continues under Wilson's direction, has the responsibility for the sale and distribution of the heating and air conditioning control the company produces for homes.

Wilson joined Honeywell in 1931 as a student engineer. He has held numerous sales and administrative posts since and was made vice president in 1956.


# FOR EVERY HEATING-COOLING NEED

Now, no matter what the final layout, you can offer a Honeywell *Custom* Control Panel that will specifically fit the job's needs—and your customer's wishes.

You can offer your customer the exact switch and thermostat combination he wants. Simply stock one thermostat—the Honeywell Round, plus the famous Honeywell Sub-Bases. They match perfectly with any Honeywell Control Panel. Honeywell Control Panels contain time-proven components for long life and dependable performance. They are attractive, compactly designed; are guaranteed for one year as a complete unit.

And when you deal with Honeywell you take advantage of the best field service in the industry, backed by years of engineering experience plus the industry's most complete line.

**For air conditioning systems with remote condensing sections ... a control panel in *two parts***

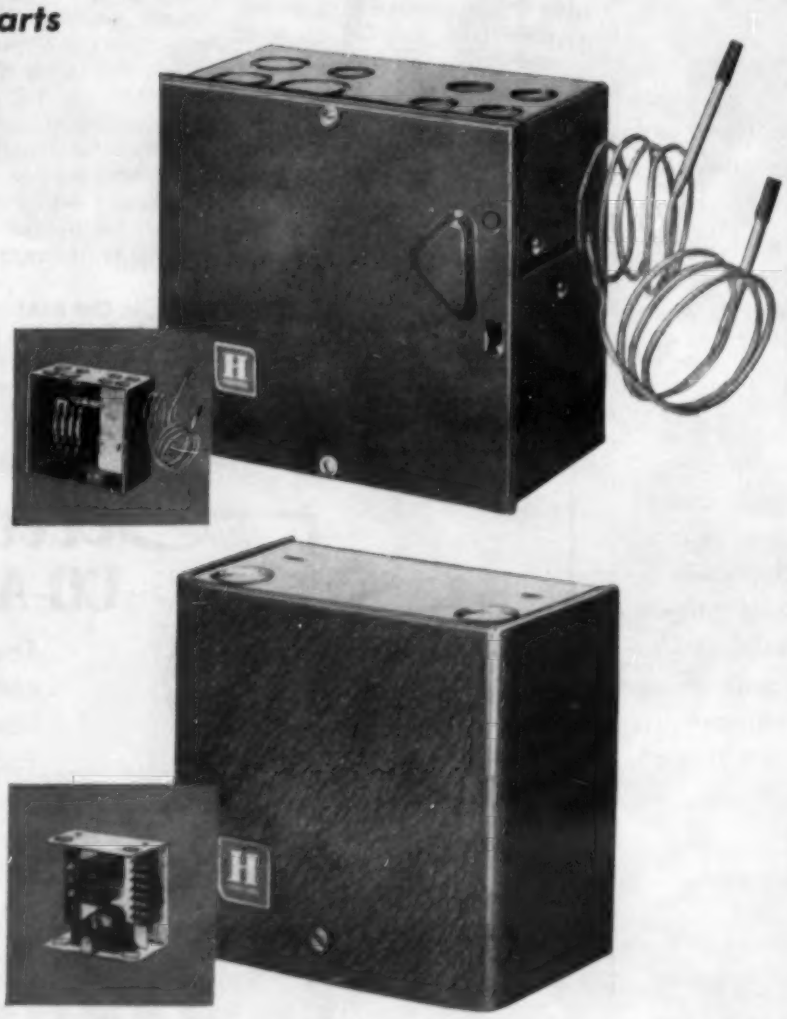
**Condensing section control, mounted outside—the W400—**

It operates compressor and condenser fan on demand from *inside* (W226) control and thermostat. Also provides Hi-Lo pressure control. Convenient knockout arrangement and accessible terminals make for easy field wiring. And exclusive new Honeywell built contactors give sure starts and positive stops. Choice of 24, 30 or 40 amp. contactors and 24 or 30 amp. starters.

**Evaporator section control, mounted inside—the W226—**

*Available in the following models:*

**W226A**—single-speed fan relay and transformer.
**W226B**—2-speed fan relay and transformer.
**W226C**—single-speed fan relay, heating relay and transformer.
**W226D**—2-speed fan relay, heating relay and transformer.
**W226E**—single-speed fan relay, reset relay and transformer.
**W226F**—2-speed fan relay, reset relay and transformer.



MINNEAPOLIS **Honeywell**

**Year-Round Temperature Controls**

*112 offices across the nation*


*For more information about products advertised on this page use Information Center, page 34.*

# Automatic Test Board, 6-Station Welder, 2-Spindle Honer Help Maintain Standards

AN AUTOMATIC test board designed to reduce the element of human error in inspecting fractional horsepower electric motors is now in operation at Wagner Electric Corp.

THIS welder completes all six welds on hermetic motor stators simultaneously. It can also weld smaller stators two at a time permitting an output of more than 100 units per hour.

HONING MACHINE hones rotor bores of hermetic motors to a tolerance of .0005 in. and operates in continuous cycles at the rate of 100 or more units per hour.

ST. LOUIS — An automatic test board, a vertical six-station heliarc welder, and a two-spindle honing machine are being used to maintain high production standards for Wagner Electric Co.

The automatic test board reduces the element of human error in inspecting fractional horsepower electric motors.

The welder completes all six welds on hermetic motor stators simultaneously. It is also designed to weld smaller stators two at a time, permitting an output of more than 100 units per hour.

The honing machine hones rotor bores of hermetic motors to a tolerance of .0005 in. and operates in continuous cycles at the rate of 100 or more units per hour.

The welder and honing machine were developed by Wagner engineers.

### *Accurate Tests Outlined*

With the test board accurate tests of locked, pull-up, full load, and no load characteristics, vibration amplitude and noise level are performed automatically by linear programming.

Meters on the board are preset to rigid engineering standards for each motor rating and any abnormal condition in the motor is indicated by a red light below the meter for that test.

Satisfactory performance is indicated by a green light. The motor is also given a high potential dielectric test before it is released from the board.

### *Conveyors Carry Motors To Test Board*

Motors are carried to and from the test board by conveyors so no lifting or hoisting is necessary. The operator merely slides the motor into position on a turntable, and attaches the motor terminals to the test board with convenient connectors.

The welder has reduced product rejections and human error in the operation. The high frequency arcs are shielded with carefully controlled mixtures of inert gases producing strong, continuous welds free from scale and impurities.

Since all six welds are made simultaneously, stresses in the stator laminations are equalized. This results in a uniform product with improved electrical characteristics and a minimum of physical distortion, the company said.

The stator laminations are first stacked and pressed together in a separate hydraulic press to assure correct stator core length. Two of the assemblies are then placed on the welder spindle.

A hydraulic press attached to the welding machine, and duplicating the pressure of the first press, forces the spindle and stators down into position for welding.

Welding arcs are struck automatically as the spindle begins to retract past the welder on its return cycle. Six finished welds are completed on the two stators in just 21 seconds.

### *Loading Table Holds Six Rotors*

The loading table of the honing machine accommodates six rotors, sealed in honing fixtures to prevent interlamination contamination. Only the rotor bores are exposed to the specially compounded coolant oil.

The table rotates to bring two rotors into position beneath the hones which descend and, when the honing operation is completed, retract automatically.

While the next two rotors are being honed, the finished bores are checked on an air gauge, the fixtures removed from the table, and two more rotors installed in the vacant positions.

The finished rotors, still in their fixtures, pass through an automatic washer and are unloaded and the fixtures re-loaded by a second operator.

During final inspection and testing, the bores are again checked for size.

## *Gibson Refrigerator Sales In August Set Recent Years' Record*

GREENVILLE, Mich. — The Gibson Refrigerator Co.'s August shipments of refrigerators broke all records in Gibson's recent years history.

Gibson's August refrigerator domestic sales ran ahead of any previous month in 1956 and 40% ahead of the same month a year ago. W. C. Conley, vice president in charge of Gibson sales, said the August carloadings far exceeded the factory's highest expectations for August.

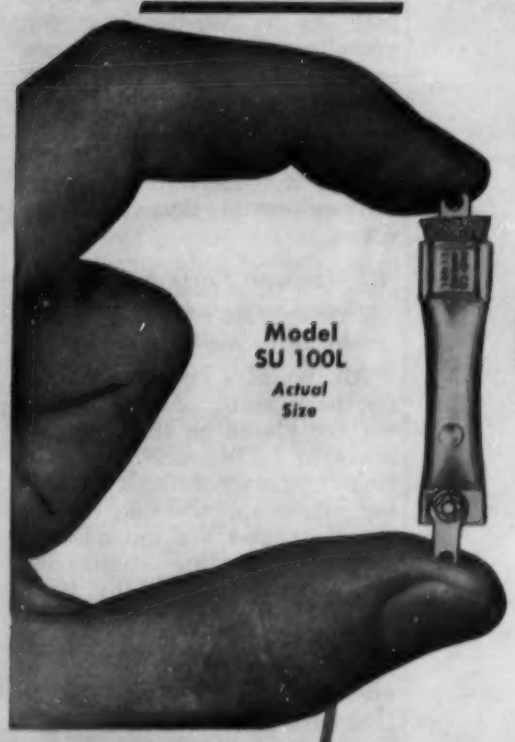
## Mathieson Names Randle Div. Quality Control Mgr.

NEW YORK CITY — Mason M. Randle has been appointed control manager for the Western Brass Mills Div., Olin Mathieson Chemical Corp., J. E. Williams, vice president and general manager, announced recently.

Randle had been manager of Roll-Bond market development. He succeeds Herbert A. Ball, who has been transferred to New Haven to become special test superintendent of the recently created Nuclear Fuel Div.

The quality control manager's duties are being expanded to include customer relations.


THE SAFEST MOTORS ARE PROTECTED WITH MIGHTY MITES




AVAILABLE IN VARIOUS MODELS FOR EVERY APPLICATION

Mighty Mite Thermal Protectors give motor windings truly dependable and continuous protection against charring of insulation, burn-out and eventual customer dissatisfaction. U. L. rated thru ¼ H.P.

Mighty Mites are supplied "ready-to-use" and fit into electric motor stators without design changes or special assembly procedure. Our accurate temperature calibration of Mighty Mites to specific motor requirements assures safe and positive performance in your motors and equipment. Mighty Mite protectors are tamper-proof and thoroly dependable.

Write or phone today for engineering data.

MIGHTY MITE THERMAL PROTECTORS

MECHANICAL INDUSTRIES PRODUCTION COMPANY
223 ASH ST. AKRON, OHIO
Phone Portage 2-7673



Edwards
CO-AXIAL CONDENSERS

A TYPICAL CONFIGURATION— EFFICIENT, COMPACT DESIGN

The NEWEST design in water-cooled refrigerant condensers. Used by major equipment manufacturers because of these—

SELLING ADVANTAGES:
- Use 35% less water
- Cost reduced 30 to 40%
- Stock sizes: ½ to 7½ tons
- No internal joints
- Easy installation
- Many compact shapes

Send for catalog TT-652 TODAY or call TERHUNE 5-2808

EDWARDS ENGINEERING CORP.
100 ALEXANDER AVENUE • POMPTON PLAINS, NEW JERSEY




*For more information about products advertised on this page use Information Center, page 34.*

# *Die-Cast Components Give Precision Control to Amana Window Conditioner*

AMANA year-round air conditioner employs a unique die cast sliding control which permits selection with finger-tip ease.

AMANA, Iowa—To select six different combinations of cooling, heating, dehumidification, and ventilation of Amana's new Year 'Round Air Conditioner, a unique sliding control mechanism has been designed around a certified zinc die cast rack and spur gear assembly.

Automatically controlling all operations, the new design eliminates the battery of control knobs and levers generally used to perform these operations.

During initial design stages, Amana engineers decided to utilize a single sliding knob to control the unit's functions. Thus by simply sliding the knob to the "Off," "Cool," "Dry Cool," "Cool Vent," "Fan Vent," and "Heat" positions indicated on an illuminated dial, all the necessary switching of dampers, compressor and fans is accomplished automatically.

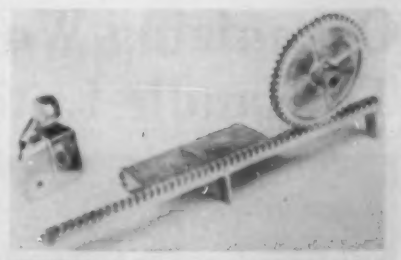
Because of the close dimensional tolerances required for the accurate control necessary, Amana engineers turned to a job shop die caster to produce the components. Consultation between Amana engineers and die caster has resulted in a highly successful zinc die cast design for the spur gear and control carriage of the air conditioner.

To provide a means of turning the switch to the desired positions, the sliding control mechanism utilizes a die cast spur gear which is attached to the shaft of a rotary electrical switch.

The spur gear, in turn, is driven by a rack gear which is a part of the zinc die cast control carriage.

The control carriage moves horizontally and transfers the linear positioning motion into the desired damper door positions through cable runs and switch positions through the gear train.

The sliding control knob is attached by screws to the control carriage, providing finger-tip control of the air conditioner. The control knob is a brass die casting which has been chrome plated for appearance and durability of finish.



CERTIFIED zinc die cast spur gear, rack gear and control carriage in position. Control knob, left, is attached to control carriage which moves horizontally, controlling damper doors. Rotating spur gear operates switch positions.

# *E. D. Raney Heads New Ranco Research Lab In Ft. Lauderdale*

COLUMBUS, Ohio — Establishment of an additional Ranco Research and Development Laboratory in Fort Lauderdale, Fla., was announced recently by A. M. Hoover, president of Ranco Inc.

E. D. Raney

The new installation, devoted to the development of controls for household appliances and air conditioning, will serve as an advanced research center in addition to present engineering facilities in Columbus serving the firm's five production plants.

E. D. Raney, secretary of Ranco Inc., will head up the new operation.

E. C. Raney, chairman of the board of Ranco Inc. and a four-year resident of Ft. Lauderdale, will take an active part in the laboratory's developmental activities.

The new laboratory, located at 3080 N.E. 12th Terrace, in Ft. Lauderdale, is starting comparatively small with facilities for expansion as the project grows.

Both local and non-local engineering personnel are being recruited to staff the new Florida installation, Hoover reported.

Ranco Inc. now represents production facilities in Columbus, Delaware, and Plain City, Ohio, and Tannochside (near Glasgow) Scotland.


*Test after Test has Proved...*

*the* SERVICEABILITY *of* HOUDAILLE'S NEW FINISH ON FREEZER SHELVES *and* EVAPORATORS OF STEEL

▶ Every conceivable type of test has demonstrated that in addition to reducing the cost of *steel* freezer shelves and evaporators, Houdaille's new electro zinc plating and processing facilities produce the most serviceable of finishes.

Tests at 100% humidity and 100°F for over five times as long as commercial standards require, failed to affect the finish or produce signs of corrosion.

Rapid cycle defrosting tests equal to over 4 years of severe useage left Houdaille cooling plates good as new.

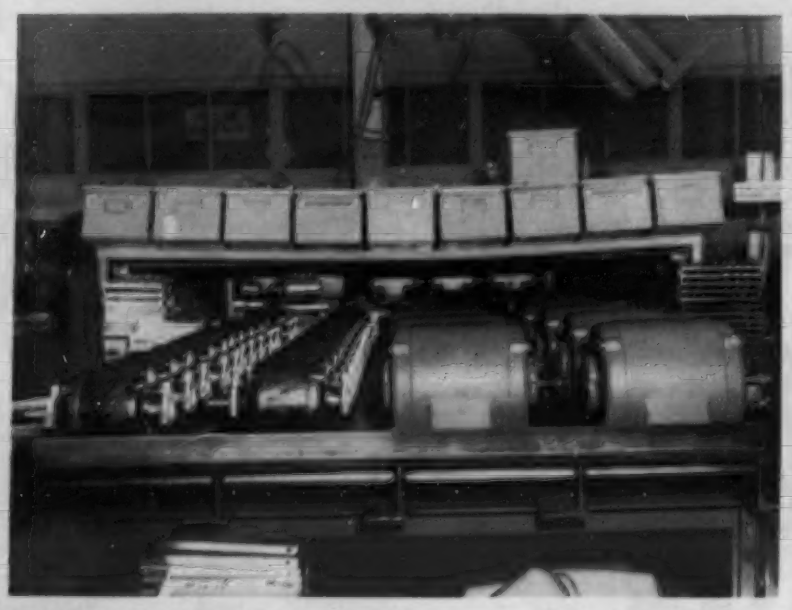
Tests for abrasion, bending, scratching, chipping and resistance to acids and chemicals further demonstrated virtual indestructability.

Yes, this new finish combined with the interior cleanliness and other advantages of Houdaille's copper brazed, tube on plate or plate on plate precision construction in steel, offer today's best answer to sales appeal and service-free evaporators and freezer shelves. Our engineering and test facilities are available to cooperate in producing units to meet your exact need.

HOUDAILLE INDUSTRIES, INC.
NORTH CHICAGO DIVISION
1900 FOSS PARK AVE., NORTH CHICAGO, ILL.

*Manufacturers of:* Evaporators, Cabinet Cooling Plates, Freezer Shelves and Condensers

# Organizing Working Area, Worker's Materials Permits Man To Handle Entire Blower-Motor Assembly Operation Series



THIS VIEW of the motor-bench at Airtemp shows the step-saving arrangement that permits the assembler to work with more than one type of blower-motor—or to shift, as required, from one horsepower or voltage to another.

EVERYTHING he requires to equip blower-motors with their mounting bases, pulleys, and cables is near at hand for Airtemp employe, Carl Wilmoth.

DAYTON—Organizing a working area and a worker's materials has made it possible for one man to handle the entire series of assembly operations on all blower motors for Airtemp Div., Chrysler Corp.

Adjacent to the company's air-cooled condenser line is a separate post where blower motors for 2, 3, 5, and 7½-hp. air-cooled units are attached to their mounting bases, equipped with pulleys, and wired—the latter applying only to 5-hp. condensing unit motors.

With the attachments the motors are then ready for installation in the units being assembled on the continuously moving conveyor line.

### *Special Motor-Work-Bench Aids Organization*

For the most part, the "better organization" was accomplished through the design and construction of a special motor-work-bench. The bench permits full time to be devoted to assembly.

Prior to the bench-facility, motors and other parts were stored in the general area but not in a uniform, easy-to-work-with manner. Motors had to be lifted individually from the floor to the table, which process was assembly-slowing and fatiguing.

### *Roller-Incline Keeps Motors Within Reach*

With the present system, the motors move down a roller-incline so that they are always in easy reach. Pulleys and other parts are stored in bins, so they too can be reached without extra steps.

A stockman sees to it that motors are always on the roller-ramp and the parts bins filled. Materials always at hand, the man behind the bench is free to devote his full 8 hours to assembly.

In their first stages of assembly, Airtemp air-cooled units flow by the blower-motor station continuously. They never have to tarry. The motors they require are always waiting—ready to be installed.

## *Coleman Appoints Rowe Mfg. Director*

WICHITA, Kan.—W. L. Rowe has been appointed director of manufacturing of the Coleman Co., Inc.

He has been vice president in charge of manufacturing of the Coleman Lamp & Stove Co., Ltd., Toronto, and will continue to supervise manufacturing at the Canadian subsidiary as well as the United States factories in Wichita and La Porte, Ind.

He replaces Douglas C. Albright who has resigned from the company.

Assisting Rowe will be Harold J. Fryar, who will be assistant director of manufacturing and will also continue as director of purchasing.

Fryar joined Coleman in 1928 as a cost accountant and was general purchasing agent from 1940 to 1948.


**Warranted Two Years**

## New *Redmond* Single-Bearing MonoMotor

### INCORPORATES DESIGN PRINCIPLES NEVER BEFORE AVAILABLE IN FHP SINGLE-BEARING MOTORS

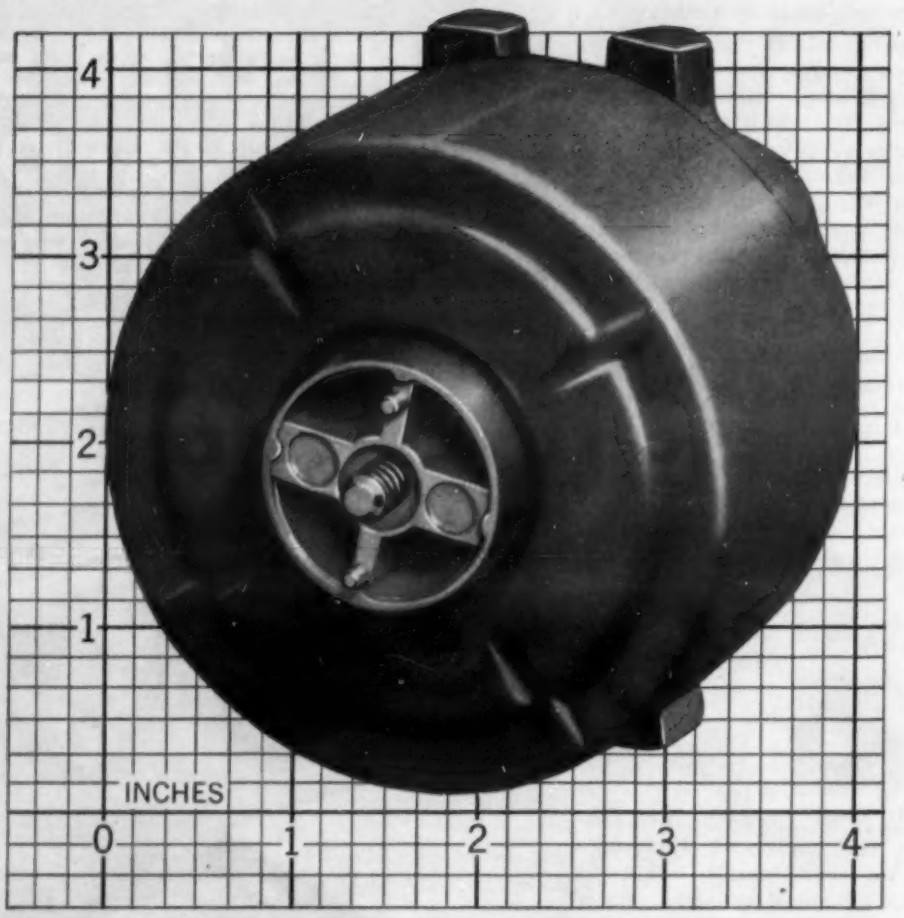
The Tri-Flux design, described and illustrated at the bottom of this page, is available only in Redmond small-diameter motors. This design adds a third area of magnetic flux which greatly increases the efficiency and starting and running torques of the AM-4 over conventional old style single-bearing motors.

Redmond's Uni-Cast construction allows the precision manufacturing that results in a motor that is smooth-running and quiet and can be depended on to give years of service-free performance. Exact bearing alignment, uniform air gap, and the elimination of magnetic wedges assure long life and whisper-quiet operation.

The AM-4 is guaranteed not to leak oil in all-angle use or in shipment. The new positive oiling system provides an extra large oil reservoir for lifetime lubrication. Positive oiling is achieved through the forced recirculation of the lubricant, which is completely suspended and uniformly distributed in pure wool and nylon wicks.

Made of a durable, lightweight metal, this new single-bearing motor is considerably lighter than conventional old style models.

Designed for all-position mounting—vertical shaft up, shaft down, or any angle—and interchangeable to accommodate all standard brackets and special mounts, the AM-4 is adaptable to a wide variety of applications.



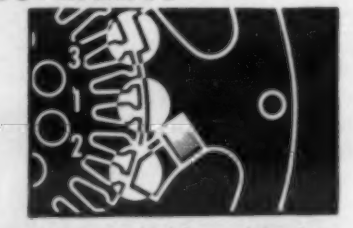

### Designed Specifically for the Refrigeration and Air Conditioning Industries and Adaptable for a Wide Variety of Applications

The AM-4 is a 4-pole motor, 1550 r.p.m., 115 volts, 60 cycles. It is available in odd voltages and frequencies, and is rated at 1½, 4, 6, 9, 12, and 16 watts. ¼" external shaft diameter is projected in bearing to 5/16" for added strength. There are six lead outlets.

### How Tri-Flux Design Improves Performance

The salient pole single phase induction motor has only one flux path—indicated by the white circle—between the field and the rotor. The motor is not self-starting—for commercial value a starting mechanism must be added.

The second white circle indicates the flux path added by wrapping a shading coil around the trailing pole tip. Power and uni-directional action are increased in this shaded pole induction motor, and it is now self-starting. This motor is now practical at low cost, and is used for applications requiring limited starting torque.



Note that a third flux path has been added at the leading pole tip. This was accomplished by Redmond's Tri-Flux design, whereby a "reluctance notch," which can be seen in the third white circle, is put in the leading pole tip. Efficiency and starting and running torques are greatly increased. New applications are opened to these improved, low-cost motors.




*For more information about products advertised on this page use Information Center, page 34.*

# New Techniques Aid Production of Zinc-Plated Steel Components

NORTH CHICAGO, Ill.—Houdaille Industries, Inc. has recently announced completion of new facilities for finishing evaporators, freezer shelves, and cooling plates for household refrigerators and freezers.

### *Process Developed For Houdaille*

The facilities include a plating line which produces an electro-zinc plated surface and new automatic finishing and baking of the finishes. The new finish was specially developed for the steel evaporators.

Although zinc-plated steel evaporators have been perfected for several years, the company explained, production techniques were not perfected until approximately two years ago.

Houdaille's current production of evaporators, freezer shelves, and cooling plates are constructed of either steel tubing brazed to a steel sheet or one embossed sheet of steel brazed to another, flat or embossed.

In the first construction, the steel tubing forms the refrigeration circuit. The circuit pattern is limited only by what bends may be performed.

### *Variations Virtually Unlimited*

In the steel plate on plate construction, variations in the circuit patterns are virtually unlimited.

The copper brazing of Houdaille evaporators and freezer shelves takes place in electrically heated, controlled temperature, controlled atmosphere furnaces. The brazing temperature is 2,050° F., and the brazing takes place in a completely purged protective atmosphere.

This protective atmosphere prevents scale and removes any oxides at the high temperature, and does not allow decarburizing at the surface of the parts being brazed.

### *Work Completely Dehydrated In Furnace*

This very desirable condition combined with the high temperature, completely dehydrates the work passing through the furnace.

Houdaille steel evaporators and freezer shelves are plated with a minimum of .0005 in. of a smooth, firmly adherent and ductile electro-zinc plate. Houdaille uses a "plating quality" steel which is free from laminations and substantially free from seams and surface imperfections.

To start the plating process, the parts to be plated are hung on racks which are well insulated except for the contact points. This insures that the plating current will be directed to the production part only.

The racked parts are immersed in an anodic, reverse current, alkaline cleaner which has a temperature of approximately 200° F.

Next the parts are thoroughly rinsed in a spray stall sufficient to remove the alkali from the previous operation.

An acid pickling operation removes any occasional rust on the surface. The solution in the pickling tank is maintained at 150° F. ± 5° F.

The parts are next immersed in a combination soak and spray water rinse and then receive another anodic alkaline cleaning followed by another water spray rinse.

Next is an acid dip to neutralize the alkali remaining from the second cleaning operation and to remove any oxides present on the steel surface. Again the parts are rinsed in water.

### *Cyanide Dip Follows*

A cyanide dip follows. This tank may be used as storage for the cleaned parts that await transfer to a zinc plating tank.

After another water rinse the parts are immersed in a zinc-plating tank for a sufficient length of time so that the product of current density in amperes and time expressed in minutes equals 600 ampere minutes per sq. ft. of surface area.

To obtain this result the current density may be 20 to 30 amperes per sq. ft. with the corresponding plating times 30 to 20 minutes.

During plating the work is mechanically oscillated. The solutions are constantly filtered at a rate sufficient to turn over the contents of the tank once per hour. There are no brighteners added to this solution.

Another water rinse is followed by immersion in a bright dip solution to brighten the surface if only a clear finish coat is to be applied.

Rinsed again the parts receive a Proseal treatment (zinc conversion bath), which prepares the zinc-plated surface for painting, and further increases the corrosion resistance properties of the zinc coating.

### *Hot Water Rinse*

Finally a hot water rinse at a temperature close to the boiling point causes rapid drying.

During the unracking process and all subsequent handling before being moved to the automatic painting conveyor, clean gloves are worn by all operators.

After coming from the electro-zinc plating line the parts are washed and rinsed. They are then pre-baked in Houdaille's new paint bake oven at 400° F. for 15 minutes. This is to insure drying and eliminate the possibility of any hydrogen inclusions in the plated surface.

They then pass through a cooling chamber which cools them to room temperature with a large volume of filtered air. Following the cooling chamber they pass on to the aluminum epoxy based resin dip tank. If another color is desired, they are dipped or sprayed with the pigmented finish.

Next in line is a tunnel where the parts are allowed to drain in cooled, filtered air before passing on to the electrostatic detearing station where the parts are deteared and the "fatty edges" are held to an absolute minimum.

After detearing, the parts return to the oven and the aluminum or color finish is baked at 425° F. for 20 minutes.

Once again a cooling chamber cools the parts to room temperature in filtered air. The parts then proceed to the clear coat dip tank. Another pass through a filtered air tunnel drains off excess finish material.

Again the parts pass over an electrostatic detearing table. They are baked again at 425° F. for 20 minutes and sent to the packing-shipping department.


**for Customer Satisfaction**

## Features All-Angle Operation

### STANDARD AM-4 RATINGS

**Totally Enclosed**
**Any Position Mounting**

**115V • 60 CYCLES • 4-POLE • 1550 RPM • ALL-ANGLE OPERATION**

| Model Number | Watts Output | AMPS | A ±3/64 | Hi Impedance Protected | Duty | | Weight Lbs.-Oz. | Notes |
|---|---|---|---|---|---|---|---|---|
| | | | | | Fan | Mechanical | | |
| *AM-4000J | 1.5 | .30 | 2 45/64 | YES | YES | YES | 2-2 | 1. All standard model numbers are clockwise rotation facing shaft end of motor. Opposite rotation supplied on request. 2. All motors comply with U. L. and C. S. A. electrical design standards. |
| *AM-4001J | 4 | .44 | 2 45/64 | YES | YES | NO | 2-2 | |
| *AM-4200J | 6 | .46 | 2 41/64 | YES | YES | YES | 2-9 | |
| *AM-4300J | 9 | .58 | 3 13/64 | YES | YES | NO | 3-1 | |
| AM-4400A | 12 | .72 | 3 25/64 | YES | YES | NO | 3-9 | |
| °AM-4401A | 16 | 1.03 | 3 29/64 | NO | YES | NO | 3-9 | |

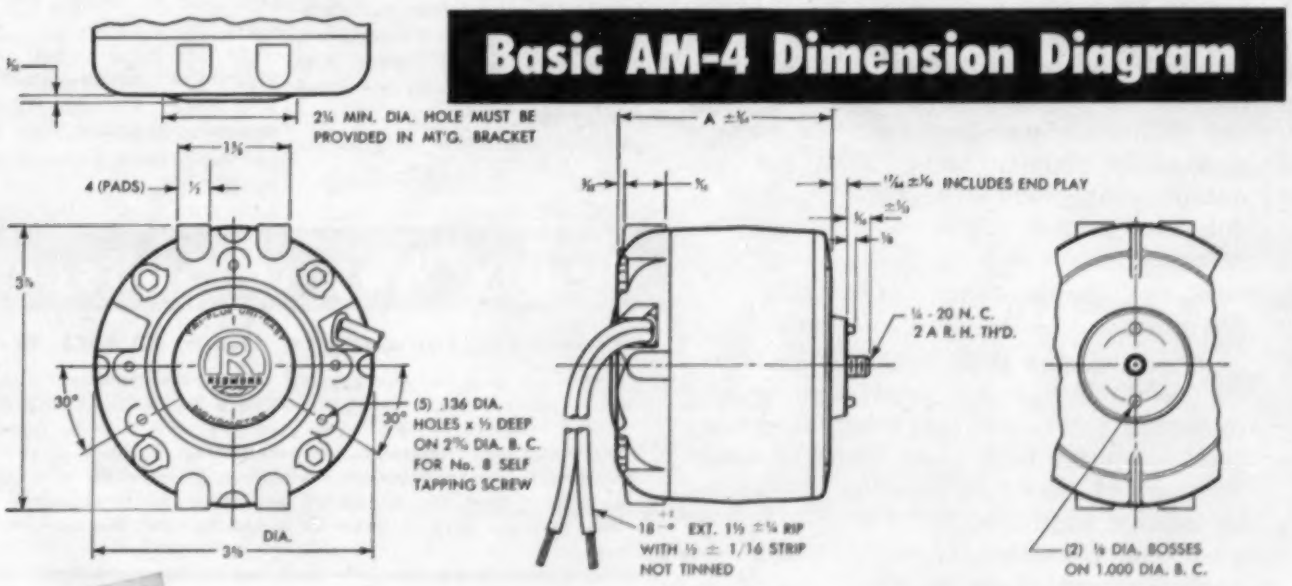
*May be operated on 50 cycles at 1300 RPM—Fan Duty—Hi-Impedance protected.
°Thermal protected.

### OPTIONAL FEATURES

Motors are supplied standard as shown. Also available are other features of special stud extensions, sleeving over leads, other lead material, feed-thru switches, plugs, terminals, conduit clamps and special lubricant as required for exceedingly high and low ambient operation.

Other performance ratings for various voltages, frequencies and loads can be supplied for your product. Our sales engineers will welcome the opportunity to assist you in developing the most practical motor for your applications.

### Basic AM-4 Dimension Diagram


2¼ MIN. DIA. HOLE MUST BE PROVIDED IN MT'G. BRACKET
4 (PADS)
3¾
30°
30°
(5) .136 DIA. HOLES x ½ DEEP ON 2⅞ DIA. B. C. FOR No. 8 SELF TAPPING SCREW
DIA.
A ±1/64
INCLUDES END PLAY
¼ - 20 N. C. 2 A R. H. TH'D.
18 EXT. 1½ ±¼ RIP WITH ½ ± 1/16 STRIP NOT TINNED
(2) ⅛ DIA. BOSSES ON 1.000 DIA. B. C.

**Send for Complete Performance Data**

Write the Redmond Co., Owosso, Michigan, for the "AM-4 Bulletin." At your request we will have a sales engineer call.

*The Standard of Dependability*

Redmond COMPANY Inc. OWOSSO, MICHIGAN

ADVERTISED IN The Saturday Evening POST

THE BIG NAME IN SMALL MOTORS


*For more information about products advertised on this page use Information Center, page 34.*

They'll Do It Every Time

by

Jimmy Hatlo

BROKEN? SABOTAGE! THAT'S WHAT IT IS! WHO WAS USING THIS MACHINE LAST? LINE UP, EVERYBODY! TELL ME EXACTLY WHERE YOU WERE JUST BEFORE THIS HAPPENED!!
EVERY MACHINE IN THIS CAVE IS OLDER THAN MRS. METHUSELAH—THEY OUGHTA BE IN THE SMITHSONIAN INSTITUTION AN' BULLWHIP OUGHTA BE WITH 'EM...
THE JANITOR'S BROOM GOT BALD-HEADED, AN' BULL WANTED HIM TO BUY A NEW ONE—
THIS ABACUS AIN'T WHAT IT USED TO BE, EITHER—BUT A NEW ONE COSTS A WHOLE BUCK—
THE LAST THING THEY BOUGHT AROUND HERE WAS THAT BANNER "WELCOME, GENERAL GRANT"
LISTENING TO THE STRAWBOSS BLOW HIS ROOF WHEN NOAH'S ARK SPRINGS A LEAK..."
THANK AND A TIP OF THIS HATLO HAT TO MURIEL RICHELSON, 463 ALABAMA AVE., BROOKLYN, N.Y.

# ADVANCED Manufacturing Techniques Guarantee Continued Prosperity

Unquestionably (and apparently unquestionable as a proposition) it has been the fashion in recent years to pundit:

"Our problem isn't production—that we have licked."

"Production facilities have outgrown people's ability to consume."

***"From now on management*** will have to concentrate on the lost art of selling."

This latter proposition is one to which this publication subscribes wholeheartedly, as the record shows. We agree with the academic economists, management consultants, and executives all up and down the line and staff that selling, advertising, merchandising, and promotion are the most important areas of examination and endeavor for every corporation, partnership, and Ma-and-Pa store RIGHT NOW, and in the foreseeable future.

***At the same time experts*** in economics and business management may be guilty of underestimating what revolutionary production techniques can do for salesmen and their collaborators (contractors, dealers, advertising agencies, *et al,* and *et cetera).*

Too often there's a porcupined, booby-trapped psychological gulf between makers and sellers. Each thinks the other is a necessary evil, and maybe not so necessary at that. At least, not so necessary as HE is.

Human though it may be, that bristling attitude is foolish. Sure, there's no point in making something unless it can be sold. But if it weren't for imaginative "slide rule boys" (who introduce new products and manufacturing methods) salesmen would get bored with their jobs. They'd have to sell the same old things. And advertising men would ulcer-die younger than normally for their profession (which has a death-rate much too high).

***Moreover, people wouldn't buy*** so much from salesmen or contractor-dealers if it weren't for ADVANCED manufacturers, because new-idea stuff to make consumers dissatisfied and longing wouldn't exist.

This issue of AIR CONDITIONING & REFRIGERATION NEWS is devoted to ADVANCED Manufacturing processes—reports of technological progress which will put money in the bank for OEM suppliers, consumer goods manufacturers, dealers, contractors, and sales personnel (women and men).

Here's just one example: Approximately five months ago an editorial in AIR CONDITIONING & REFRIGERATION NEWS challenged the plastics industry to come up with complete integral cabinets for refrigerators and air conditioners. Already—in record time—this challenge not only has been accepted, but is near fruition.

***By saving immense amounts*** of money in tooling costs, plastic housings for refrigerated products will enable imagineers to introduce a tremendously wide variety of consumer-titillating forms and shapes which could obsolete whatever refrigerators, freezers, room air conditioners, commercial refrigerators, etc., consumers presently own. Reason: manufacturers now can afford to experiment with radical designs (thanks to low-tooling-cost all-plastic cabinets) until they find a design with genuine consumer appeal.

"Planned obsolescence," which has been the key to automobile-manufacturing prosperity, hitherto has eluded the refrigerating business. We've been stuck with products which rarely wear out, and which are ultra-expensive to change.

***ADVANCED manufacturing*** techniques, such as the example mentioned above, might be the clue to this previously elusive factor in our industry's progress.

Contractors, wholesalers, distributors, branch managers, dealers, servicemen, and salesmen . . . please read this issue of AIR CONDITIONING & REFRIGERATION NEWS carefully. It may open new horizons of activity and profits for you come next—to quote a perennially popular barber shop harmony quartet song—February, January, June or July (the song is entitled appropriately for salesmen, "Harvest Moon").

Something herein may give you an idea for a hitherto unconceived saleable item.

Over and over again in the refrigeration, air conditioning, appliance, and heating industries (all related and intertwined now) OEM suppliers have given ideas to manufacturers of consumer products. By taking an interest in production progress, the men who sell consumer products locally, no doubt, can contribute valuable ideas, too.

***"One for all and all for one"*** is a spirit which will help everyone connected with our excitingly promising industry to achieve bounteous personal progress.

In addition, this spirit will advance the human living standards of America and the entire world—thus helping ensure Peace for ourselves and our children.

AN INTERNATIONAL INSTITUTION • SUBSCRIBERS ALL OVER THE WORLD

Trade Mark reg. U.S. Pat. Office; Est. 1926

AIR CONDITIONING & REFRIGERATION NEWS

Copyright 1956, Business News Publishing Co.

F. M. COCKRELL, *Founder*

*'The Conscience of the Industry'*

Published Every Monday by BUSINESS NEWS PUBLISHING CO., 450 W. Fort St., Detroit 26, Mich. Telephone Woodward 2-0924. Subscription Rates: U. S. and Possessions and Canada: $6.00 per year; 2 years, $9.00; 3 years, $12.00. All other countries: $10 per year. Single copy price, 40 cents. Ten or more copies, 30 cents; 50 or more copies, 20 cents each. Send remittance with order.

EDITOR & PUBLISHER, George F. Taubeneck
EDITORIAL DIRECTOR, Phil B. Redeker
ASSOCIATE EDITOR, C. Dale Mericle
ASSISTANT EDITORS: John Sweet, Hugh Mahar, George Hanning, Robert Lacey
RESEARCH MGR., John MacLean

GEN. MGR., Warren Jones
GEN. PROD. MGR., Walter Schuler
ADV. PROD. MGR., A. M. Barrow
CIRCULATION MGR., Herbert Spencer
SUBSCRIPTION MGR., Rosalie Ashley
READER'S SERVICE MGR., Vincine Mogyorodi

PRESIDENT, Edward L. Henderson
ADV. MGR., Robert M. Price
WESTERN ADV. MGR., Allen Schildhammer
ASST. ADV. MGR., Joe Sullivan
ADVERTISING REPRESENTATIVES: Rex Smith, William Zurkan

ADVERTISING OFFICES:
New York, 521 Fifth Ave. MUrray Hill 2-1928-9 Robert M. Price William Zurkan
Chicago, 134 S. LaSalle St. FRanklin 2-8093 Allen Schildhammer Rex Smith
Detroit, 450 W. Fort St. WOodward 2-0924 Joe Sullivan
Los Angeles, 4710 Crenshaw Blvd. AXminster 2-9501 Justin Hannon

Member, Audit Bureau of Circulations. Member, Associated Business Publications.

VOLUME 79, NO. 5, SERIAL NO. 1,437, OCTOBER 1, 1956

## PATENT PROMOTERS NEED LICENSE IN CALIFORNIA

William J. Schworer and Associates
Alhambra, Calif.

Editor:

Perusing your "off the Chest" letters I noted a request by E. W. Rearfoss, Jr. asking for a list of patent promotion agencies.

I am presently engaged in refrigeration patent promotions and have licenses in effect with the Frigidaire Corp., the A. H. Witt Co., and the Risto-Brugger Co.

I know of no others in this field which in California requires a Business Opportunity to conduct.

I should be happy to provide references or further information to any of your subscribers. Furthermore, the NEWS has been a great help to me over many years and the patent pages are examined diligently.

W. J. SCHWORER

## MANITOWOC DID SHOW AT NFFLI MEETING

Manitowoc Equipment Works
Manitowoc, Wis.

Editor:

I was thumbing through the Sept. 3 issue of your fine newspaper and grasped upon the subject of the National Frozen Food meeting. It grieved me very much to see that Manitowoc was not listed amongst the exhibitors, as believe me, George, we at Manitowoc are working day and night in order to exhibit our products at the show.

I don't envy your job receiving all these seemingly petty complaints. Kindest personal regards.

JACK G. FATH,
Asst. Gen. Sales Mgr.

*Answer: Sorry, Mr. Fath, but Manitowoc was not listed in the bulletin supplied by the National Frozen Food Locker Institute.*

**Handy Way to Subscribe**

***To See the Industry In Action EVERY WEEK***

**Keep up-to-date on what's going on in your industry. You'll see action weekly in AIR CONDITIONING & REFRIGERATION NEWS. Covers latest news and gives you top how-to-do-it reports on commercial and residential air conditioning, commercial and home refrigeration: manufacturing, contracting, distributing, retailing, and servicing. Read the Industry's newspaper for profit every week. Only $6.00 per year, 52 issues (U.S. and Canada). Foreign: $10.00 per year.**

AIR CONDITIONING & REFRIGERATION NEWS 10-1-56
450 W. Fort St., Detroit 26, Mich.
Gentlemen: Send the NEWS every week for one year. ☐ $6.00 enclosed ☐ Bill me ☐ Bill Company.

Name.....
Company.....
Street.....
City ..... Zone ..... State .....

# Develop Blower Wheel To Meet Future Needs

***Air Flow Center Disc Reduces Turbulence, Ups Efficiency; Wider Hub Spread Gives Lateral Stability; Positive Lock Secures Blades***

DAYTON — A new blower wheel, introduced in 1956, shows how one manufacturer is thinking of air conditioning, not only for today, but for the next few years.

The Preslock wheel made by the Lau Blower Co. was developed as an answer to the continuing need for higher speeds in air conditioning equipment.

### *50% Increase In R.P.M. With Same Dimensions*

The new wheel will operate at a maximum of 1,500 r.p.m. against a static pressure of two to three inches. Formerly, the limit was 1,000 r.p.m. at a maximum static pressure of 1½ in. This gives an additional 50% increase in r.p.m. within the same previous dimensions.

Aspects of the design show how this is accomplished. The new air flow center disc design reduces turbulence and thus increases efficiency. There is a wider spread between hubs providing greater lateral stability. A new positive mechanical lock secures each blade to the center discs. This is one reason for the higher speeds—the blades won't fly off.

### *4 Steel Fingers Attach Blade to Center Disc*

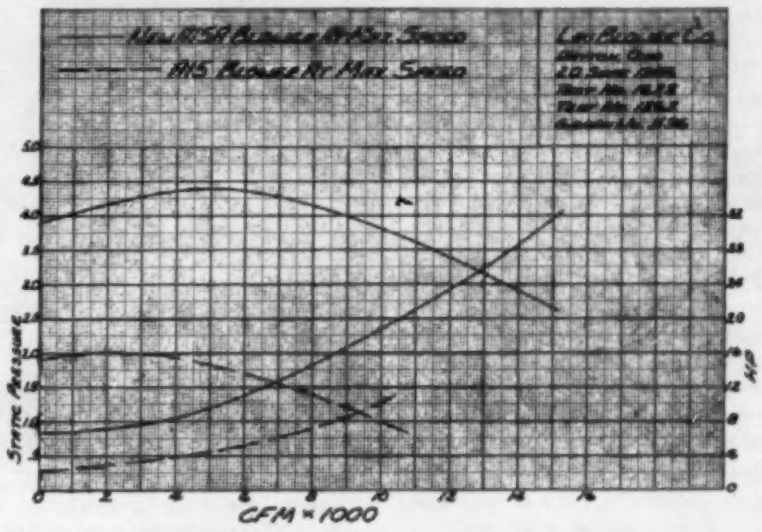
Each blade is mechanically attached to the center disc by four individual steel fingers individually pressed within the blade. Some ⅜-in. has been added to the end ring for more rigidity and to bear the stress of higher speeds.

The new wheel can be supplied from cold rolled steel, stainless steel, rustproof steel, or aluminum.

### *Increases Air Delivery Without Upping Blower Size*

The new design will make it possible to increase air delivery of equipment without increasing the physical size of the blower, the manufacturer states. Since the demand for more air delivery is steadily growing, more air must enter the unit and there will be greater pressure drop throughout the unit.

The accompanying chart shows the maximum theoretical performance for the new wheel. Lau engineers point out that the maximum is not yet required in air conditioning, but that the new wheel will do the job when required. They say that the theoretical maximum is possible if good blower engineering practice is followed with respect to side and back wall clearances, filter areas, and other key phases.




THIS CHART shows the maximum theoretical performance of the new Lau blower wheel. The maximum is not yet required, say company engineers, but the new wheel will do the job when it is required.

## Hussmann Declares 100% Stock Dividend

ST. LOUIS — Hussmann Refrigerator Co.'s directors have declared a 100% stock dividend for payment Oct. 10 to stockholders of record of Sept. 28.

In addition, a quarterly cash dividend of 25 cents a share was voted on the new stock, payable Nov. 1.

The company said the cash dividend on the new shares is, in effect, an increase of 10 cents.

## *Lonergan To Double Capacity In Planned Plant Expansion*

ALBION, Mich.—S. J. Lonergan, president of Lonergan Mfg. Div. of McGraw Electric Co., has announced a major plant addition to the Albion location.

This expansion, scheduled for early 1957 completion, will double present production capacity.

Lonergan said the expansion "has become necessary because of greatly increased sales of Coolerator room and residential air conditioners, dehumidifiers, and 'window fans.'"

Lonergan also stated that, in addition to 115,000 sq. ft. of company warehouse space at Albion, regional warehousing along with product service stations are now in operation as a convenience to the company's direct to dealer organization.

## Mitchell Names Sheridan Sales Development Chief

Sheridan

CHICAGO — Appointment of Robert Sheridan to a newly-created post, manager of products and sales development in the commercial and residential air conditioning division of Mitchell Mfg. Co., has been announced by J. W. Alsdorf, president.

Sheridan will assist in expanding the line of Mitchell package units, developing merchandising programs for distributors and dealers, developing a strong national distributor organization, and setting up a training program for field people in the advance application of products and in installation and service techniques, it was explained.

In many of today's best heating and air conditioning units you'll find famous McQuay "Ripple Fin" Coils as *original equipment*. McQuay coils perform a big job efficiently and economically for "Brand Name" manufacturers who specify McQuay because of proven "Ripple Fin" design, the extended surface that provides maximum heating or cooling.

The mechanical expansion of copper tubes into plate type aluminum fins gives superior contact between fins and tubes. Multi-row coils have staggered tubes for prolonged air contact.

The flexibility of McQuay design permits thousands of tube and fin variations and assures you the most efficient coil for your application. Modern manufacturing facilities speed coils for your production schedules.

**With 15 OEM Sales Engineers across the Nation, McQuay, Inc. can give you prompt engineering service.**

McQuay Inc.

**1600 BROADWAY N.E., MINNEAPOLIS 13, MINN.**

HEATING • AIR CONDITIONING • REFRIGERATION

# Automatic Moisture Detector Allows Speedy Check on Production Line

## *Non-Technical Workers Operate Automatic Unit at Kelvinator*

*Editor's Note:* An automatic moisture detecting apparatus for use on production lines producing refrigeration systems has been developed by the Kelvinator Div., American Motors Corp. The original development of the device was accomplished by Douglas Fernlock, head of the Quality Control Laboratory at the Kelvinator Detroit plant. The William Christensen Co., Detroit, specialists in process research and development in the refrigeration field, was employed to develop the device further and build a machine for production use.

*By Douglas Fernlock*

Since the development of mechanical refrigeration, one of the most important problems in the production of refrigerating systems has been the elimination of moisture inside the sealed system, to insure trouble-free operation for many years.

A typical household refrigerator today is refrigerated by a system that includes a number of important components which must be completely dehydrated before final assembly, sealing, and charging. These principal components are the compressor, including electric motor and pump in an air-tight sealed chamber or dome; evaporator, or frozen food chest, with channels for refrigerant passage in the walls; condenser to discharge heat absorbed during the refrigeration process; and connecting tubing that carries refrigerant between compressor, condenser, and evaporator.

### *Many Methods of Control Have Been Tried*

There are many opportunities for unwanted moisture to remain within the system and eventually cause it to become inoperative. Control of moisture accumulation in these components is a prime necessity in refrigeration manufacturing, and many methods have been used through the years.

Kelvinator, as a pioneer in both domestic and commercial refrigeration fields, has long sought a method of dehydration control that would quickly and readily recognize variation in dehydration processing before large quantities of rejectable components are processed. To achieve this goal, some form of instrumentation was necessary at inspection points on the production line.

### *Standard Dehydration Test of Components*

Let us review briefly the more or less standard dehydration test of component parts. It consists of passing dry nitrogen or air through a component placed in an oven and collecting the moisture driven off in a previously weighed train of absorption bulbs. The gain or loss in weight of the second and third bulb is subtracted from or added to the first bulb and moisture reported usually in parts per million or milligrams per liter.

Variations in test procedure generally are:

1. Duration of test time.
2. Quantity of nitrogen or air flowing through component.
3. Test temperatures.
4. Application of heat.

Typical test condition for a small evaporator are:

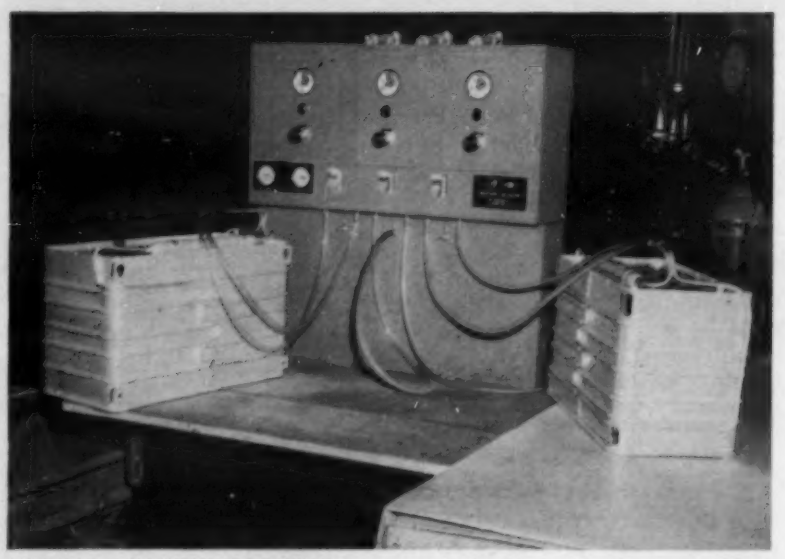
1. Test time—two hours.
2. Nitrogen or air flow—1 C.F.H.
3. Oven temperature — 250° F.

With the present day tendency toward smaller refrigerating systems and smaller refrigerant charges, with lower temperatures and quantity production, it is often impossible to keep production on a safe basis using the standard laboratory method.

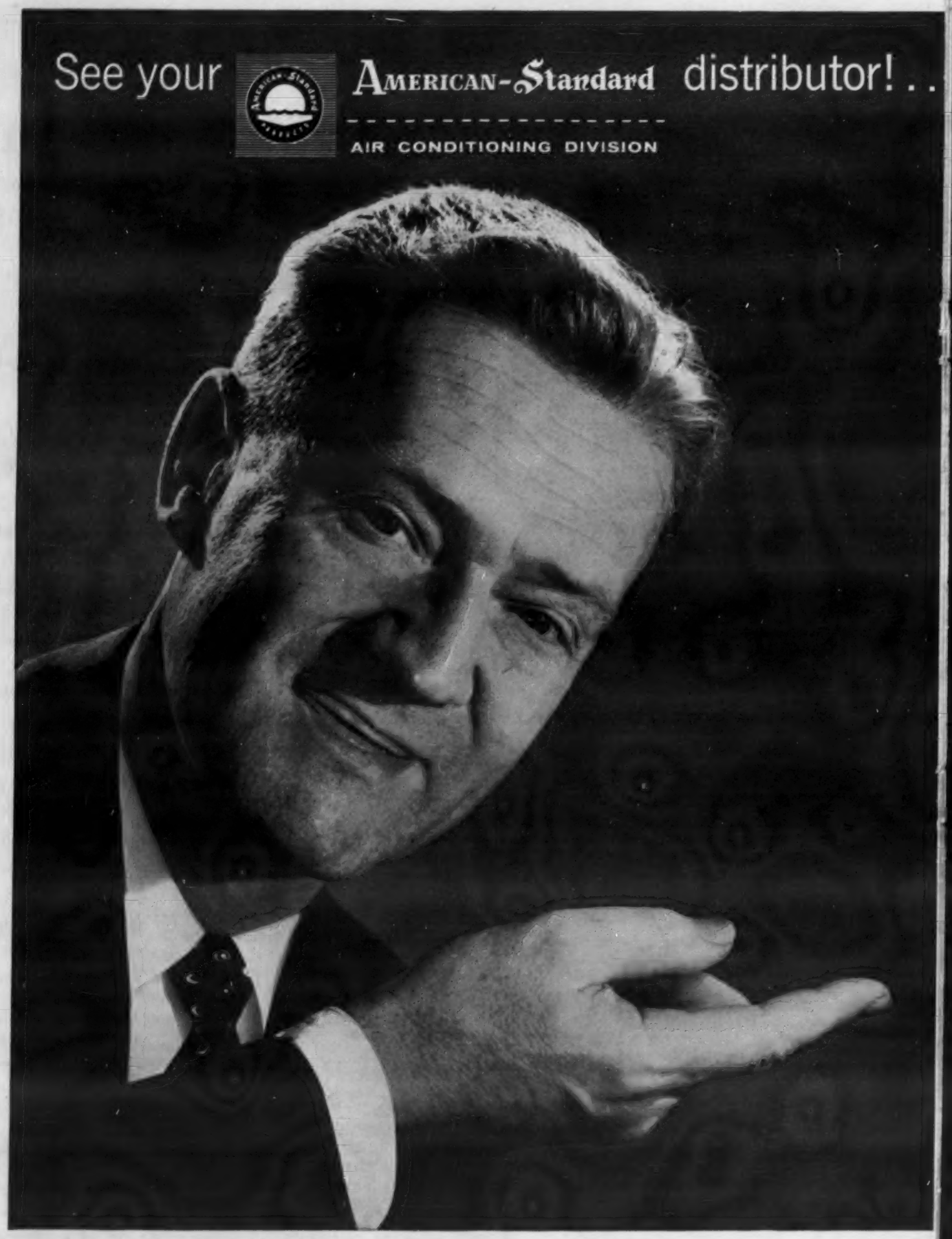
Too much time is required to determine the moisture content of a few parts. Frequently it is desirable to institute a 100% check on the part when the process is out of control limits; that is, even after "baking" on the production line, the part still is not properly "dry." The only recourse then is moisture testing in the production areas. Some of the requirements in production testing are:

1. Short test time of 10 to 30 seconds with no up or down scale adjustment between tests.
2. Recovery time of one min-

*(Concluded on next page)*



AUTOMATIC MOISTURE DETECTING apparatus in "triple unit" design, as used in the Detroit plant of the Kelvinator Div., American Motors Corp., is shown in actual use here. It is said to combine the desired elements of accuracy, speed, and simplicity.






*For more information about products advertised on this page use Information Center, page 34.*

## Production Line Moisture Testing--

*(Concluded from preceding page)*

ute or less after saturation holds to a minimum the number of stand-by instruments required.

3. Freedom from reference to charts or graphs to interpret results.

4. Simplicity of operation.

Various instruments are being used for moisture checking in production areas. To name a few:

1. Dew pointers.
2. Thermal conductivity gauges.
3. Electrical conductivity gauges.

While these instruments are excellent for the application for which they were designed, they are not without some disadvantages when used in high-speed production testing.

A moisture detecting instrument has been developed at Kelvinator which meets the requirements for moisture testing in the production area. The principle is based on a rise in temperature of a desiccant (in this case, calcium sulphate) when absorbing water vapor. The temperature rise is detected by a thermocouple placed on the outlet side of a small cylinder filled with the desiccant.

Provisions were made for automatically filling the test cylinder from a desiccant hopper and dumping it at the conclusion of each test—thus re-establishing the zero point for each test. Should saturation occur, a one minute purge of dry air will restore the small cylinder to test conditions.

SINGLE UNIT automatic moisture detector has been developed and is being produced by the William Christensen Co., Detroit.

In use, a regulated supply of dry air or nitrogen is passed through the component and into the test cylinder of the instrument. The presence of water vapor is indicated by a reading obtained on a microammeter, the magnitude and duration of the reading having a direct relationship to the quantity of moisture present in the component.

The electric circuit includes a signal, either audible or visual, which may be set to various reject limits, thus relieving the operator from the necessity of interpretations. The moisture detector possesses excellent sensitivity and will readily determine water vapor concentrations in the range of four parts per million (by weight) of air.

Calibration is accomplished by the usual primary standards, using air or test gas with predetermined moisture content. One method in use at Kelvinator for a hasty check is to micropipette a few milligrams of water into an insulated flask of suitable volume maintained at constant temperature. When equilibrium is attained, these flasks are carried to the moisture detector for reference checks.

The moisture detector here has been successfully operated by non-technical personnel on the Kelvinator production line. As a rapid, economical method for determining excessive moisture content of evaporators, receivers, and condensers, it furnishes valuable information for a reliable quality control of dehydration processes.

Method of moisture detection employed by the device is based on the fact that a crystalline substance, calcium sulphate ($CASO_4$), is subjected to a temperature rise when exposed to moisture, proportional to the quantity of water present.

This temperature rise is also relative to the quantity of dessicant and air flow across the dessicant. The temperature differential will normally fall in the range of 1/10th to 1° F. dependent on the previously mentioned variables.

Smallest amount of dessicant consistent with sensitivity is used. Test sample block is constructed of plexiglass so that the dessicant test volume is visible to the operator at all times.

The electrical equipment for each unit consists of a sensitive meter relay and accessories, a thermistor bridge, two interval timers, a rotary solenoid operated nylon mesh butterfly, three solenoid air valves, and necessary relays and wiring. By use of a precise meter relay for directly measuring the thermistor bridge signal, periodic maintenance and recalibration necessary in a tube type amplifier circuit is eliminated.

The thermistor bridge was used as a temperature sensing device because of the following desirable qualities: (a) extremely sensitive to minute temperature changes; (b) small size; (c) no electrical contacts to burn or wear out; (d) last indefinitely, require no maintenance.

When the unit has been properly calibrated in the laboratory and all sensitivity and bridge balancing adjustments have been made, the operator takes the following steps to put the apparatus into operation:

1. Throws a toggle switch which energizes the unit electrically, and lights up a green light in the same location which remains on as long as there is no power failure in the unit.
2. Checks the air pressure indicators and corrects if they are not registering the settings indicated on the meter face plate.
3. Connects the unit under test by means of the "Tygon" tubing provided.
4. Presses the starter button momentarily. This starts the test cycle which is in operation for 10 seconds. During this period the test block will be lighted up indicating a test is in progress.
5. If a reject occurs the red light comes on and remains lighted until the operator connects the smaller of the two tubes to the drying actuator. This introduces drying air to the feed tube and the test block for a period of 60 seconds.


.....He's the man with the complete

# DEALER PROFIT PROGRAM

No half-way measures . . . no half-way profits when you join up with your distributor of American-Standard Air Conditioning Division products. You'll find that he's a *specialist* in warm air heating, summer cooling and year 'round air conditioning . . . with a complete, top quality product line plus full technical and promotional service. He has *everything* you need to build your reputation as a specialist . . . to sell constructively . . . to sell in volume. Contact him for the Complete Dealer Plan—he's listed in your classified telephone directory under "Furnaces" and "Air Conditioning Equipment". Or, if more convenient, just mail the coupon.

*Complete product lines*

**HEATING.** Gas-fired and oil-fired winter air conditioners in basement, utility, counterflow and horizontal models . . . all sizes. Also coal-fired winter air conditioners and gravity furnaces, oil burners and gas burners.

**COOLING AND YEAR 'ROUND.** American-Standard is now the largest residential line on the market! Full range of water-cooled add-on and package models; 2, 3 and 5 hp air-cooled outdoor condensing units plus vertical, counterflow and horizontal air-flow and blower-equipped evaporators. Large selection of heating-cooling combination units equipped for gas or oil firing with water-cooled or air-cooled summer air conditioning.

*Complete technical assistance*

**TRAINING CENTER** at American-Standard Air Conditioning Division factory, Elyria, Ohio, provides intensive courses, both elementary and advanced, covering all phases of heating and cooling layout, installation and servicing.

**"HOW-TO" MANUALS.** Complete, concise technical data are provided in easy-reference form; also, detailed installation and application manuals on each and every model.

**FIELD SPECIALISTS.** You work closely with your distributor's technical specialists who, in turn, are backed by American-Standard field and factory engineers. This means that you can approach even the most difficult equipment applications with confidence and authority.

*Complete promotion*

**DEALER IDENTIFICATION.** "Authorized Dealer" Certificate, indoor and outdoor illuminated signs, window banners and many other impressive identification items are included.

**NEWSPAPER AD MATS.** Wide variety of heating, cooling and year 'round pre-tested ads and product cuts.

**SALES LITERATURE.** Dozens and dozens of colorful pieces to help you promote and sell effectively.

**RADIO AND TV.** One-minute spot announcements and recorded singing commercials for radio; one minute filmed commercials for TV.

**COOPERATIVE AD PLAN**—the industry's most liberal cost-sharing promotional program.

AMERICAN-Standard

AIR CONDITIONING DIVISION

American-Standard Air Conditioning Division (Dep't AR-10)
40 West 40th Street, New York 17, N. Y.

Please have your nearest distributor present The Complete Dealer Plan.

NAME_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____


*For more information about products advertised on this page use Information Center, page 34.*

## *Install Evaporative Condenser Atop Tall Denver Bldg.*

PICTURED is a DFC-30 Recold evaporative condenser as it was raised to the top of one of mile-high Denver's tallest structures, the Denver Club building. Refrigeration Engineering, Inc. built the unit for installation in the air conditioning system of the exclusive Denver Club which occupies the top three floors of the building.

DENVER — Refrigeration Engineering, Inc. of Los Angeles attained new "heights" recently when one of its "Recold" evaporative condenser units was installed atop one of the tallest buildings in mile-high Denver.

A DFC-30 Recold evaporative condenser was used in the air conditioning system which was installed in the Denver Club building to cool the top three floors of the Denver Club.

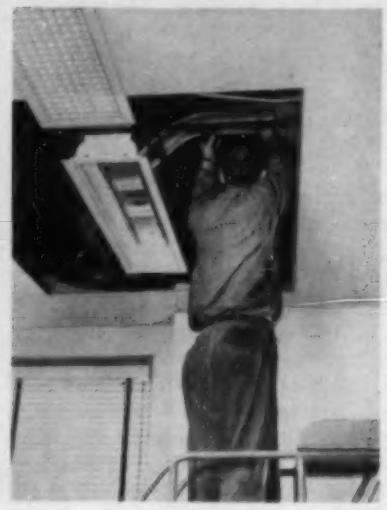
The Recold unit for the private club was sold through the McCombs Supply Co. of Denver.

The R. A. Haines Co. of Denver was the air conditioning contractor on the installation and McCarty Johnson Plumbing & Heating Co., the contractor.

Other equipment used in the installation included a Trane 100-ton chilled water system with a DXF2006K Acme chiller.

## 2-Purpose Ceiling Fixture Provides Light, Diffuses Conditioned Air

ELECTRICIAN installs "Multi-Vent Trofferlite" in drop ceiling.



SHEET METAL MAN connects flexible tubing to duct in the unit.

CHICAGO—A new dual purpose fixture was jointly developed here by Pyle-National Co. and Benjamin Electric Mfg. Co. Called the "Multi-Vent Trofferlite," the unit diffuses conditioned air and provides illumination.

Adaptable to any drop-type ceiling, the Multi-Vent Trofferlite is claimed to simplify engineering, make possible cleaner, more attractive interior design, and lower initial cost.

Said to improve air conditioning quality and increase light output, the single fixture reduces number and variety of fixtures required.

Where minimum cooling is needed the fixtures can remain unattached to the air duct or shut down, the companies explained.

They also eliminate dirt smudges on ceilings.

## To Use Conditioning To Speed African Oil Exploration

CARTHAGE, Tunisia — Having tested the idea successfully this summer at an oil exploration center deep in the Sahara, Frenchmen in Algeria hope to use air conditioning to speed up the development of areas which Europeans have found unbearable.

At the oil exploration center, Europeans, for the first time, stayed on the job throughout the summer. The workers were limited to four or five hours' work daily in the torrid outdoors. They spent the rest of their time in air conditioned quarters and recreation areas, it was noted.

The experiment was a success, with the workers suffering no ill effects, according to reports from people who visited the testing station.

Now, the French hope to use air conditioning to further exploration and development of the African interior down to the Ivory coast and Dakar.

They admit, however, that it will take a long time.

At present, air conditioning is used on a very limited scale. Only a few of the swankier Algiers dwellings have window units; a few hotel bars in Tunis, Algiers, Oran, and Morocco's larger cities are air conditioned; and here and there you find a store with air conditioning equipment.


# General Electric air conditioners make it easy to do business

## easy to sell...

So easy to install—no work-stoppages or serious alterations. Big jobs can be done step-by-step. *Floor models* can be installed in-space or out-of-space. *Ceiling-mounted models* need no floor space, include water-cooled and air-cooled units.

## easy to finance...

General Electric offers the most attractive financing plans in the industry, including the following...

INVENTORY PLAN. Carry as many G-E units as you need on your floor or in your warehouse until July 31st—you invest only 10% of the purchase cost.

INSTALLATION PLAN. You get your equipment cost when customer signs order—and balance of selling price after installation is completed. Your working capital goes further—your credit remains good—and you pay no interest charge.

FOUR CUSTOMER-PAYMENT PLANS. 1. Easy Payment Plan for customers low on cash. 2. Skip-Payment Plan for more pre-season sales. 3. Pay-As-You-Profit Plan with payments during hot months when G-E units are in use. 4. Earned Depreciation Plan with longer, more flexible terms for large installations.

## easy to service...

In fact, no service at all on cooling system. Motor, compressor and condenser are sealed by flame to keep dirt and moisture out, vital refrigerant and oil in. Entire refrigeration system is covered by General Electric's unsurpassed 5-year warranty. Call your G-E Packaged Air Conditioner Distributor for full story of a G-E Dealership, or write: C. J. Rigby, General Electric Company, Commercial & Industrial Air Conditioning Dept., 5 Lawrence St., Bloomfield, N. J.

# packaged AIR CONDITIONERS

*Progress Is Our Most Important Product*

GENERAL ELECTRIC




*For more information about products advertised on this page use Information Center, page 34.*

INTERIOR, Falcon exhibit, Southwest Furniture Market, Dallas last July. One of the 3-ton cooling units with directional duct on top, can be seen just to the right of the column, left side of photo.

# Air Conditioning Display Space Ups Furniture Mfr.'s Sales 50% at Mart

DALLAS — Air conditioning its temporary display space at the Southwest Furniture Market here last July upped sales for the Falcon Mfg. Co., producer of metal dining furniture, more than 50% above those of any other market in Falcon's 10-year history.

With outside temperature above 100° F. every one of the four days of the show, George McNeff, Falcon president, sought a means to permit customers to shop in his exhibit in comfort.

### Open Exhibition Bldg. Offered Cooling Problem

Problem was that the exhibit was located in an open exhibition building with a roof 30 to 40 ft. high. There were no interior walls and most booths were not enclosed.

To permit air conditioning, however, McNeff erected an attractive wall across the front of its space, fitted with "Anco" aluminum windows and 8-ft. wide sliding glass doors. Heavy draperies hung around the other three sides of the space.

### Warm Air Holds Cold Air Down Inside Booth

No ceiling was installed. The air conditioning installer, Jack Dorie of the Paul Davis Co., southwestern distributor for Coleman equipment, said the warm air above would hold the cold air down inside the space.

Four 3-ton packaged units, with blowers, were installed along two walls. The blowers were adjusted to sweep the entire 1,400-sq. ft. area. "Freon" lines had to be run some 50 ft. to the condensing units, placed outside the building. All lines were wrapped to prevent condensation.

### Booth Temperatures 10-15° Lower than Rest of Bldg.

Temperatures within the display area averaged 10 to 15° F. lower than the rest of the building. Falcon salesmen were pleased because they could wear coats and still be comfortable, remaining fresh and neat appearing all day long, McNeff said.

Installation costs were shared by Falcon and the Paul Davis Co. These included material, labor, and a discount on all equipment used (as demonstrators). Total cost was $420 each.

A sign at the entrance to the display told visitors that the space was air conditioned by Coleman.

McNeff and Dorie agreed that the goodwill and the business obtained far more than justified the expenditure.

## *Coleman Ups Castello to Sales Engineering Mgr.*

WICHITA, Kans. — A. M. (Tony) Castello has been appointed sales engineering manager of the Coleman Co., Inc., it is announced by C. L. Burrows, sales vice president.

Castello formerly was technical service manager of the utility operations department, and in this capacity has been active in Coleman's gas air conditioning field research and dealer training programs.

Castello joined Coleman in January, 1953.

## Utility Fan Appoints McGuire to Sales Post

LOS ANGELES — Marc W. McGuire has been named sales engineer for Utility Fan Corp., a division of Utility Appliance Corp., it was announced by General Manager Vance Smith.

McGuire

McGuire, who has spent the past year studying the internal organizations of Utility's engineering and sales departments, will travel throughout the United States on his new assignment, it was explained.

A graduate of the University of Southern California school of engineering, McGuire was a sales engineer for U. S. Electrical Motors prior to joining Utility Fan Co.

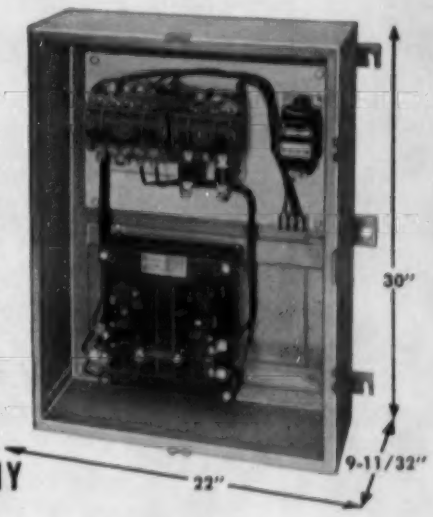
His primary duties will be the training of salesmen in the field and conducting sales meetings for distributors from one coast to the other. Utility Fan Corp. has been expanding its distributor setup.

# PROTECT against Line Disturbances

ARROW AH HART

## REDUCED VOLTAGE STARTERS

SATISFY POWER COMPANY REQUIREMENTS



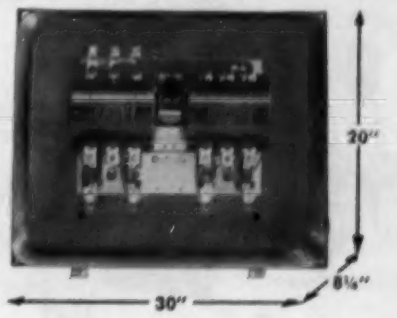

SIZE 2 30 H.P.

**TYPE "TRA" AUTO-TRANSFORMER STARTER**
FOR GREATEST POSSIBLE STARTING TORQUE

***FEATURING:*** Advanced design, lighter, more compact with straight-thru wiring. Rugged auto-transformer with taps easily adjustable for desired voltage. Adjustable accelerating pneumatic relay. A-H bi-metallic thermal overload relays.

***AVAILABLE:*** In NEMA Sizes 0 to 5, from 5 to 200 hp. NEMA I (General Purpose) or NEMA XII (Industrial) Enclosure.

**TYPE "IRA" INCREMENT STARTER**
FOR PART WINDING SQUIRREL CAGE MOTORS




SIZE 4

Reduce current inrush on light or low-inertia starting loads by 2-step method . . . second winding energized after an adjustable time lag.

***AVAILABLE:*** In NEMA Sizes 1 to 5, up to 400 hp at 440/550 volts. NEMA I or NEMA XII Enclosure.

These A-H Starters provide automatic operation with either 3-wire control or 2-wire thermostat control systems. Supplied with 3 poles for polyphase service, 4 poles for 4-wire service.

**USE THIS COUPON TO SEND FOR COMPLETE INFORMATION**

ARROW AH HART

*Quality*

MOTOR CONTROLS
WIRING DEVICES
ENCLOSED SWITCHES
APPLIANCE SWITCHES

INDUSTRIAL CONTROL DIVISION EW ECM CEE ES
THE ARROW-HART & HEGEMAN ELECTRIC CO.
103 HAWTHORN STREET, HARTFORD 6, CONNECTICUT

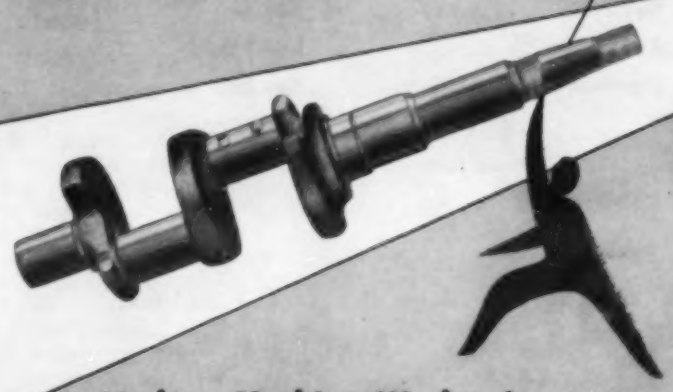
*Please send me information covering:*
☐ *A-H Reduced Voltage Starters.*
☐ *The complete line of A-H Heating, Ventilating and Air Conditioning Controls.* ACR
☐ *Others* _____
name _____
position _____
company _____
co. address _____
city _____ zone _____ state _____



# SHAFTS by MODERN

Shafts by Modern now power compressors for the leading lines of commercial refrigeration and air conditioning units. For precision SHAFTS, in quantity, consult us. Send blueprints for quotation.

SINCE 1924 . . .



**Modern Machine Works, Inc.**
*Pioneers in Shaft Manufacture*
5354 S. KIRKWOOD AVENUE CUDAHY, WISCONSIN

## Electrostatic Filter Power Pack Designed

——KEY NO. F-1010——

SCHENECTADY, N. Y.—A new power pack designed especially for use with electrostatic air filters in room coolers is now available from General Electric Co.'s Specialty Transformer Dept.

The electrostatic filter—power pack combination is designed to remove dust, grime, soot, smoke, lint, and pollen from the air before it is circulated through the house.

"The system is designed to give nearly 100% pollen protection and better than 95% effectiveness in filtering out dirt which causes discoloration," G-E said.

"The electrostatic precipitation principle has been widely used in industry for smoke abatement as well as for filtering purposes with large air conditioning systems.

"Through the use of efficient insulating materials, recently developed transformer steels, and modern manufacturing techniques, low cost power packs now make electrostatic dust precipitation economical and practical for domestic room cooler use."

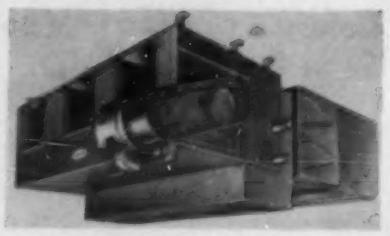
In operation, the power pack builds up an electric charge on the filter and an opposite charge on the dust and pollen particles in the air. The two are thus attracted, and the tiny particles are captured as if drawn by a magnet.

## Carrier Expands Heating, Ventilating Line

——KEY NO. F-1011——

SYRACUSE, N. Y.—An improved and expanded line of heating and ventilating products designed for large area buildings has been announced by Carrier Corp.

M. Everett Barnard, newly-appointed manager of Carrier's Unit Heater Dept., says the new heating and ventilating units have been developed to provide greater versatility and to broaden their range of application.



Barnard says the new line will offer 72 capacities and coil arrangements in six different model sizes. Output of the full line ranges from 47,000 to nearly 2,000,000 B.t.u. and from 1,500 to 32,000 c.f.m.

The versatility of the equipment is made possible by six coil capacities in each of the six units. These are available in either distributing or U-bend tube versions.

Another feature is a new "forward curved" fan which results in quiet, efficient performance at relatively low speeds.

Besides these innovations, the units are designed to permit a wide choice of installations including either wall or ceiling suspension or floor mounting.

## Warren Offers Self-Contained Low Temp Case

——KEY NO. F-1013——

ATLANTA—A new self-contained low temperature case for frozen foods or ice cream was announced recently by Warren Refrigerators here.

Called the "Profit King," it provides 15.2 cu. ft. of refrigerated display space in 22.4 sq. ft. of floor space. It will hold 812 standard frozen food packages or 774 Philadelphia pint packages of ice cream.

The case, which measures 6 ft. 8 in. long, is powered by a 1-hp. hermetic compressor in the bottom of the case. A multi-finned coil is concealed in the bottom at back, with circulator beneath the bottom porcelain liner. A heavy-duty glass air baffle is mounted in front of the display compartment.

Available at additional charge is a merchandising canopy that will add an additional 9.8 sq. ft. of non-refrigerated display space. It contains fluorescent lighting that will also light the frozen food display. With canopy, the case is 58 in. high.

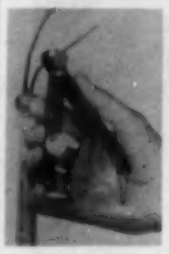
Standard features of the case include a four-glass "Thermopane" display front, concealed night cover, automatic electric defrosting system, automatic disposal of drainage, and rigidized stainless steel bumper rail.

Front exterior of the case is white acid resistant porcelain, as are the interior ends and back wall. Other exterior surfaces are baked enamel. Interior front wall and bottom liner are in black porcelain.

## Pocket Size Wire Cutter, Stripper Developed

——KEY NO. F-1012——

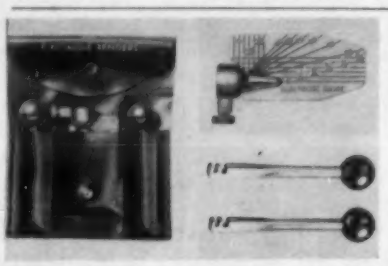
CLEVELAND—A new pocket-size wire cutter and stripper was recently introduced here by Jo-El Co.



Suitable for use on all commonly used stranded and solid copper wires, the unit's blades have been hardened and ground to cut with a smooth shearing action to sever the wire cleanly.

Adjusting the stop on the gripping handles of the 5-in. long model permits adjustment for wire size, it was noted. Jaws are closed around No. 12 solid bare wire and a setting of the adjustable stop obtains a "universal" setting from which nearly all gauges of copper wire can be stripped, the company said.

Packed in bulk, individually carded, or packed 12 on an easel backed display, the pocket tool carries a list price of $1.59.



## Electrode Gauge, Bender Kit Introduced

——KEY NO. F-1014——

CAMBRIDGE, Mass.—A kit containing a "3-D" electrode gauge and pair of electrode benders was recently introduced here by Scully Signal Co., it was announced.

New features of the gauge include vertical lines for use in setting by inch-measurement method, and large brass knob for easy, positive positioning of gauge on burner nozzle.

For use to obtain three dimensional adjustment of burner electrodes, the gauge cup is slipped over burner nozzle. Then markings are used to set electrodes for nozzle spray angle and height.

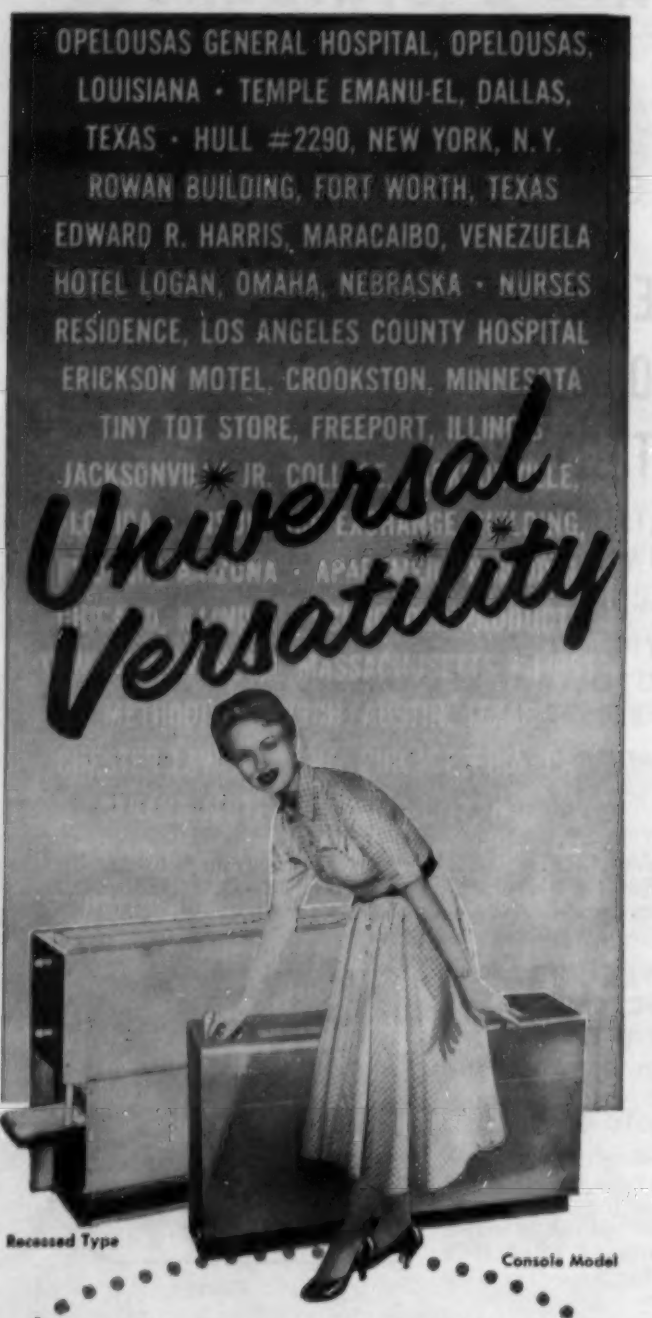
## Bending Brake Bends Sheet Metal Strips

——KEY NO. F-1015——

ROCKFORD, Ill.—Whitney Metal Tool Co. here recently introduced a small bending brake with slotted jaws and apron designed to bend up sheet metal strips on which one or more bent-up edges or seams have already been formed.

Upper and lower jaw and apron of No. 99 Whitney-Jensen 12-in. slotted brake contain matching 3/16-in. slots spaced 1 in. apart with ½-in. centers. Slots are ¾ in. deep in all members and jaws 12 in. wide so the unit can handle any folded-up or seamed pieces from ½ in. wide up to 11 in., the company stated.

Capacity of the brake is 20-gauge metal of any kind including stainless steel, it was noted. The upper jaw is in the form of an open box to provide stiffness.



OPELOUSAS GENERAL HOSPITAL, OPELOUSAS, LOUISIANA · TEMPLE EMANU-EL, DALLAS, TEXAS · HULL #2290, NEW YORK, N.Y.
ROWAN BUILDING, FORT WORTH, TEXAS
EDWARD R. HARRIS, MARACAIBO, VENEZUELA
HOTEL LOGAN, OMAHA, NEBRASKA · NURSES RESIDENCE, LOS ANGELES COUNTY HOSPITAL
ERICKSON MOTEL, CROOKSTON, MINNESOTA
TINY TOT STORE, FREEPORT, ILLINOIS
Universal Versatility
Recessed Type
Console Model

drayer-hanson
SPOTAIRE-VRC
AIR CONDITIONING

...one of seven complete lines of year-'round air conditioning equipment

Need literature?

drayer-hanson

3301 Medford Street · Los Angeles 63, California
(Division of National-U.S. Radiator Corporation)



INSTANT-ICE MACHINES

SOME CHOICE TERRITORIES OPEN!

The most complete line . . .
14 MODELS!

Production ranges from 600 lbs. to 5000 lbs. per 24 hours. Air-cooled, water-cooled. Self-contained and remote models.

THE HIGHEST QUALITY LINE!

Precision-built . . . sold on quality, convenience and dependability.

WRITE NOW!
for complete details . . .

LIQUID FREEZE Corporation
1133-24th ST · OAKLAND, CALIF.
TEmplebar 6-0424


## Information Center

For *more information* on What's New products, current literature and catalogs available, equipment advertised in AIR CONDITIONING & REFRIGERATION NEWS use Key Numbers where designated or specify products advertised and we'll see that you receive this information promptly.

**Products Advertised**
(list name, page, and issue date)

. . . . . .
. . . . . .
. . . . . .
. . . . . .
. . . . . .

**What's New or Current Literature Available**

Key No. . . . . Key No. . . . . .
Key No. . . . . Key No. . . . . .
Key No. . . . . Key No. . . . . .
Key No. . . . . Key No. . . . . .
Key No. . . . . Key No. . . . . .

Name . . . . . Title . . . . . .
(Please Print)
Company . . . . . .
Street . . . . . .
City . . . . . Zone . . . . . State . . . . . .
Type of Business . . . . . .

MAIL THIS FORM TO
AIR CONDITIONING & REFRIGERATION NEWS
*Readers Service Dept.*
450 W. FORT ST. DETROIT 26, MICHIGAN



*For more information about products advertised on this page use Information Center, page 34.*

## Low-Cost 'Tuffy' Valves Have Nylon Stems

——KEY NO. F-1016——

PITTSBURGH—A low-cost line valve to match any standard valve in new refrigeration installations was introduced here recently by Superior Valve & Fittings Co.

"Tuffy" series valves have a special grade of nylon for the entire lower stem of the unit. "This makes the valve suitable for pressure as well as vacuum below 1 micron," the manufacturer stated.

"Reports from installations now using the Tuffy valve indicate that it will outperform any standard line valve now in use," said G. R. Allen, Superior vice president.

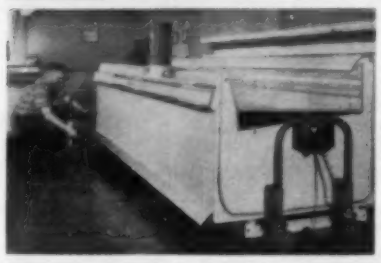
Constructed of forged brass, the small valve has two diaphragms. One is of stainless steel, the other of beryllium copper "to

assure" corrosion and wear resistance, high strength, and great flexibility, Allen added.

The design insures satisfactory operation throughout maximum operating cycles and greater flow capacity indicates low pressure drop across the valve, it was pointed out.

The special grade of nylon has ability to withstand high temperatures, while its hardness property is one of the highest in commercially available nylons, it was further stated.

Positive shut-off is assured in Tuffy line valves which are available in sizes of ¼, ⅜, ½, and ⅝ in. in both SAE and ODS connections.



## One-Man Hoist Designed To Lift One-Ton Unit

——KEY NO. F-1017——

PEORIA, Ill. — The Saf-T-Lift Co. here has perfected a new kind of hoist designed specifically to allow one man to lift a piece of equipment up to 16 ft. long and weighing up to a ton to a height of 10 in. from ground level and roll it from one place to any other desired place.

The hoist sells for $169.50 and makes any refrigeration or air conditioning equipment "portable" within a matter of seconds, the manufacturer said.

The cable arrangement of the "Saf-T-Lift" renders the hoist completely safe to use in that the heavier the equipment and the higher it is lifted, the tighter it is gripped.

The inventor of the Saf-T-Lift has been in the refrigeration business himself for many years.

Over-all width of the Saf-T-Lift itself is 18 in., height 22 in. The frame is made of 1-in. tubular steel. It is light enough to carry and it comes equipped with 25 ft. of airplane cable with a loading capacity of 4,700 lbs., the company said.

## D-H Has Built-In Home Conditioner

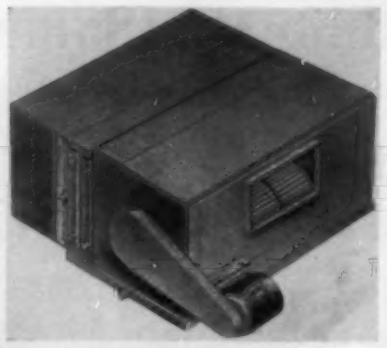
——KEY NO. F-1018——

LOS ANGELES — Drayer-Hanson Div. of National-U. S. Radiator Corp. has a "Spotaire" line of custom-built residential air conditioners which can be built right into the house.

Three types—"Deluxe Cabinet," "Concealed Cabinet," and "Basic Unit"—comprise the 13-model HRC series line. Units are compact to install in remote attic, above closet, or in furred-down hallway, have 300 to 1,750 c.f.m. capacity, according to the company.

These blower-coil-filter units heat, cool, ventilate, filter, and dehumidify quietly. Little or no ducting is necessary, with simple piping from compressor unit for the cooling cycle all that is needed, the manufacturer further stated.

A three-position air volume control covers any degree of heating or cooling required and thermostatic control is optional. Also available is a diffusion-type discharge grille, or a collar attachment for duct connections, it was pointed out.



## Air Handling Unit Line Announced

——KEY NO. F-10110——

BOSTON — A new line of air handling combination units for general applications including ventilating, heating, and air conditioning has been announced by the Sturtevant Div. of the Westinghouse Electric Corp.

The units, designated as series 1600, are available in 13 basic sizes capable of handling 500 to 48,500 c.f.m. Constant air flow is assured by the deep, closely spaced, forwardly curved blades.

Designed for minimum space requirements, all the unit components are easily accessible, facilitating inspection, lubrication, and filter changing, the manufacturer said. The complete line features standard blast and steam distributing coils, direct expansion, and water heating and cooling coils.

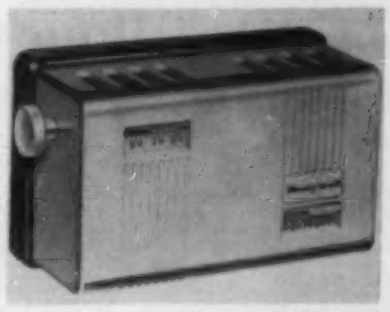
Only a single outlet duct connection is necessary. All components, such as the fan section frames and panels, coil casings, filter sections, and by-pass dampers are fabricated of heavy-gauge galvanized steel.

## Honeywell Builds 2 Line Voltage Thermostats

——KEY NO. F-10111——

MINNEAPOLIS—Two new line voltage thermostats recently were developed here by Minneapolis-Honeywell Regulator Co. for fast cycling up to 20 times an hour or cycling only three to six times an hour.

The first unit, T-40, can be used



for low-mass, quick heating-quick cooling units, the company said. Second model, T-41, is suited for large-mass, slow heating-slow cooling systems such as those in ceiling and floor cable heating applications, it was added.

Both operate without supplemental relays or transformers.

T-40 mounts horizontally, is said to be responsive to 0.4° temperature change and cycles to 15 to 20 times per hour under normal 50% heating load requirement, it was explained. T-41 thermostat mounts vertically, uses slow cycling periods to achieve high comfort level, and has operating differential of 1°.


You are the 'Equipment Specialist'

# McCALL ANNOUNCES A NEW MERCHANDISING FORCE

*for* Commercial Refrigerator Dealers

*and* Food Service Equipment Dealers

*on* McCALL

Reach-In Refrigerators *and* Upright Freezers

The McCall 'EQUIPMENT SPECIALIST' is a program designed to give mass feeding establishments buying confidence in the equipment you sell and service! The McCall 'Equipment Specialist' means that the dealer is conforming with equipment construction standards endorsed by leading food consultants, dieticians and architects—the most experienced and exacting groups in the industry.

For you as the Commercial Refrigerator Dealer it means easier *sales* and *profits* with the McCall line of approved Reach-In Refrigerators and Upright Freezers, built by the people who know the mass feeding industry BEST!

For you as the Food Service Equipment Dealer it is a *profitable* aid to help plan complete kitchen installations for Hotels, Restaurants, Hospitals, Institutions, Schools, etc. For all, the McCall program means easier selling through established confidence!

THE McCALL 'EQUIPMENT SPECIALIST' STORY WILL BE POWERFULLY TOLD!

Magazine and Direct Mail advertising to top management of Hotels, Restaurants, Hospitals, Institutions, Schools, Motels, Diners and Public Cafeterias will be barraging them with the importance of seeing their local 'Equipment Specialist.'

Dealers will receive personalized Direct Mail literature, specification sheets and a full complement of merchandising helps building you as the 'Equipment Specialist' in your area!

McCall Refrigerator Corporation
Hudson, New York

Gentlemen:

We want to put McCALL 'EQUIPMENT SPECIALIST' Advertising to work for us. Please send complete details right away!

Name.....

Firm Name.....

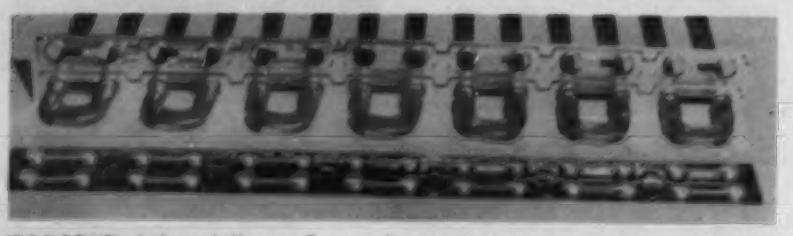
Address.....

City.....Zone.....State.....

☐ Commercial Refrigerator Dealer ☐ Food Service Equipment Dealer ☐ Manufacturers Representative

McCALL REFRIGERATOR CORPORATION • HUDSON, NEW YORK • Phone 8-1533

# 'Dog Bone' Finned Coil Eliminates Soldered Joints In Single Row



'DOG-BONE' design of Kramer Trenton fin permits it to be pushed over flattened ends of coil made from continuous length of tubing. Flattened ends are later forced back into original shape during fin bonding operation.

LENGTHS of tubing are first bent into serpentine coil shape on hydraulic bender.

COILS are inserted in stacks of fins by hand.

## *How Kramer-Trenton Gets Fins On Tube After Forming Into Serpentine Shape*

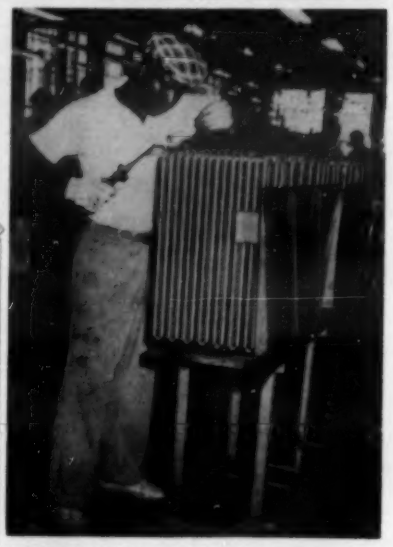
TRENTON, N. J. — Development of the "figure 8" or "dog bone" design finned coil, as the Kramer Trenton Co. calls its product, into a production item used chiefly by original equipment manufacturers for evaporators and/or condensers offers an interesting study of how some products come into existence and the gradual design changes they further undergo.

It was primarily to avoid as many soldered joints as possible in coil construction that this design was originally conceived, explains Nathan Kramer, who developed it.

Idea was, and still is, to form the coil from one continuous length of tubing. With this design there are no soldered joints in a single row coil. All the joints involved when separate return bends are used are thus eliminated. With multi-row coils soldered connections are required between the rows, but each row is a continuous tube.

Problem was how to get fins on the tube after it had been formed into the serpentine shape.

"Our original idea was to flatten slightly the return bend sections of the tube and then push the fins onto the tube," Kramer explains. "This meant there had to be slots in the fins connecting the holes punched for the round section of the tubing, the slots permitting the fins to be pushed over the slightly flattened return bends."



CONNECTIONS needed between rows are welded before flattened ends of coil are reformed.

Configuration of these slots connecting the round holes in the fins resembles a figure 8 or dog bone, thus giving rise to the use of these terms in describing this design.

### *Fin Slot Kept To Minimum*

Considerable study and experiment went into the development of this type of construction to keep the fin slot to a minimum. The return bend of the tubing was flattened to practically a thickness of the metal in the tubing.

The plan then was to expand the tube after the fins have been put on to achieve a good mechanical bond between the tube and fin. This expansion was done hydraulically.

### *Restriction and Friction Losses Minimized*

At the same time the straight portion of the tube is expanded, the flattened return bend blows up and actually expands beyond the original tube size. Thus restriction and friction losses are held to an absolute minimum, resulting in a marked improvement in performance.

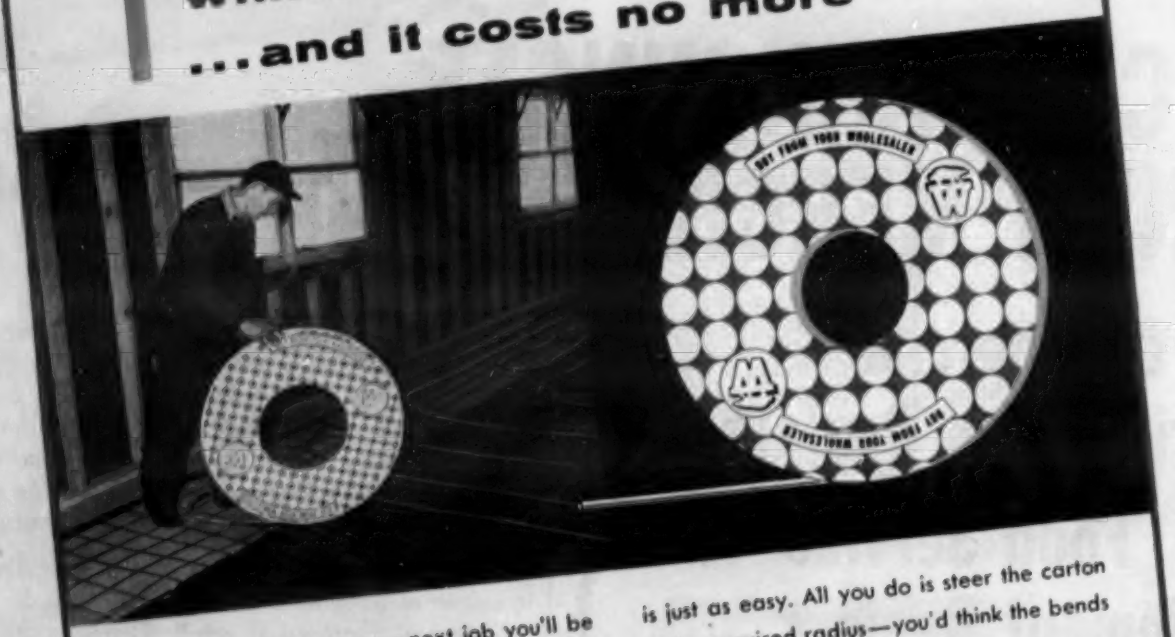
At the Kramer Trenton plant tubing for these coils is first bent into its serpentine shape on hydraulic tube benders. Various sizes and lengths of coils are produced, so the initial bending of the tubing conforms to these specifications.

Following the bending operation, all the return bends at one side of the coil are flattened in a press and then annealed in a gas furnace. The annealing is

*(Concluded on next page)*


Now—you can give your customers . . .

a reel with every roll of copper tube ...and it costs no more




Let's suppose that on your next job you'll be laying lines of copper tube for a radiant heating installation. There are two ways it can be done.

You can use the old-fashioned, hard-to-handle bunch type coil or you can do it the fast, modern way with Wolverine Roll-O-Tube®—copper tubing in the carton with the "built-in" reel.

With Roll-O-Tube all you do is hold the tube as you roll the carton back. The resulting line is achieved quickly and easily, is dead straight and free from aggravating kinks. Making the many bends necessary in radiant heating is just as easy. All you do is steer the carton in the required radius—you'd think the bends were machine made.

Roll-O-Tube helps you in other ways, too. It rolls like a hoop, is easy to carry and features a zip-quick gummed tape opening. And don't worry about unused tube. It remains in the carton—protected against damage and dirt—ready for instant use.

As we said there are two ways to handle radiant heat installations. Next time try the Wolverine Roll-O-Tube way—it's a "reel" time saver.

BUY FROM YOUR WHOLESALER

DIVISIONS OF CALUMET & HECLA, INC.
CALUMET DIVISION
WOLVERINE TUBE DIVISION
CANADA VULCANIZER & EQUIPMENT CO., LTD.
FOREST INDUSTRIES DIVISION
GOODMAN LUMBER CO.

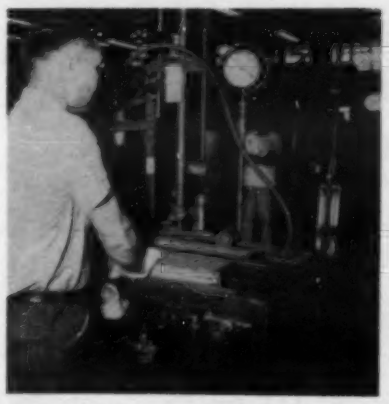
WOLVERINE TUBE
Division of Calumet & Hecla, Inc.
1413 CENTRAL AVE., DETROIT 9, MICH.
Manufacturers of Quality-Controlled Tubing and Extruded Aluminum Shapes

PLANTS IN DETROIT, MICHIGAN, AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES

● Wolverine Roll-O-Tube was designed to help increase your sales because it helps your customers do their work more easily. You'll find other sales boosters in Wolverine's booklet: Wolverine Tube is Easy to Sell. Write for your copy today.




*For more information about products advertised on this page use Information Center, page 34.*



HYDRO-STATIC pressure up to 3,000 p.s.i.g. expands tubes to form bond with fins and reforms flattened return bends of coil, which had been previously annealed.

LEAK test is made with air at 300 p.s.i.g. while coil is submerged in water.

## 'Dog Bone' Coils-

*(Concluded from preceding page)*

necessary so that the flattened bends can be safely forced out into their original round cross-section under hydraulic pressure.

### *Tubes Inserted by Hand In Only a Few Seconds*

The dog-bone type fins are stamped out of continuous aluminum rolls, the fins automatically dropping on mandrels in front of the presses. At small benches directly beside the presses, the preformed tubes are inserted by hand into stacks of fins. This operation requires only a few seconds.

Next operation is welding in place the tube connections needed when the coils are more than one row deep to form a continuous or multi-circuit coil.

### *Expanding Tube To Get Mechanical Bond Between Fins and Tubes*

Then comes the step of expanding the tubes to achieve mechanical bond between fins and tube and to round out the flattened ends of the tube. This is performed with water under hydrostatic pressures running as high as 3,000 p.s.i.g. while the assembled coil is clamped in a fixture.

### *Testing for Leaks*

This serves as a rough leak test, too. Under such high pressure, larger leaks immediately show up because water spurts out through them.

A check for small, pinhole leaks is also made, however. This is done by subjecting the coil to 300 p.s.i.g. air pressure in a water bath.

When the coil has successfully passed this leak test, the leads are trimmed and sized.

Final step in coil production is to dehydrate the coils in large ovens maintained at 350° F. with forced air circulation for an hour. As soon as the coils are brought out of the dehydrating ovens, they're capped and sealed to prevent the entrance of moisture.

DEHYDRATION of coils is done in ovens maintained at 350° F. with forced air circulation. This takes an hour.

### Waste King Ups Price

LOS ANGELES—A price increase of 1% on household garbage disposers, to jobbers and dealers, was announced recently by Bertram Given, executive vice president, Waste King Corp.

## *Hupp Names Smith To Head New International Division*

CLEVELAND — Hupp International has been formed as a division of Hupp Corp., it was announced by Don H. Gearheart, president.

Headed by Donald S. Smith, Hupp vice president and director, the new organization will have responsibility for administration of all Hupp Corp. activities outside the continental United States.

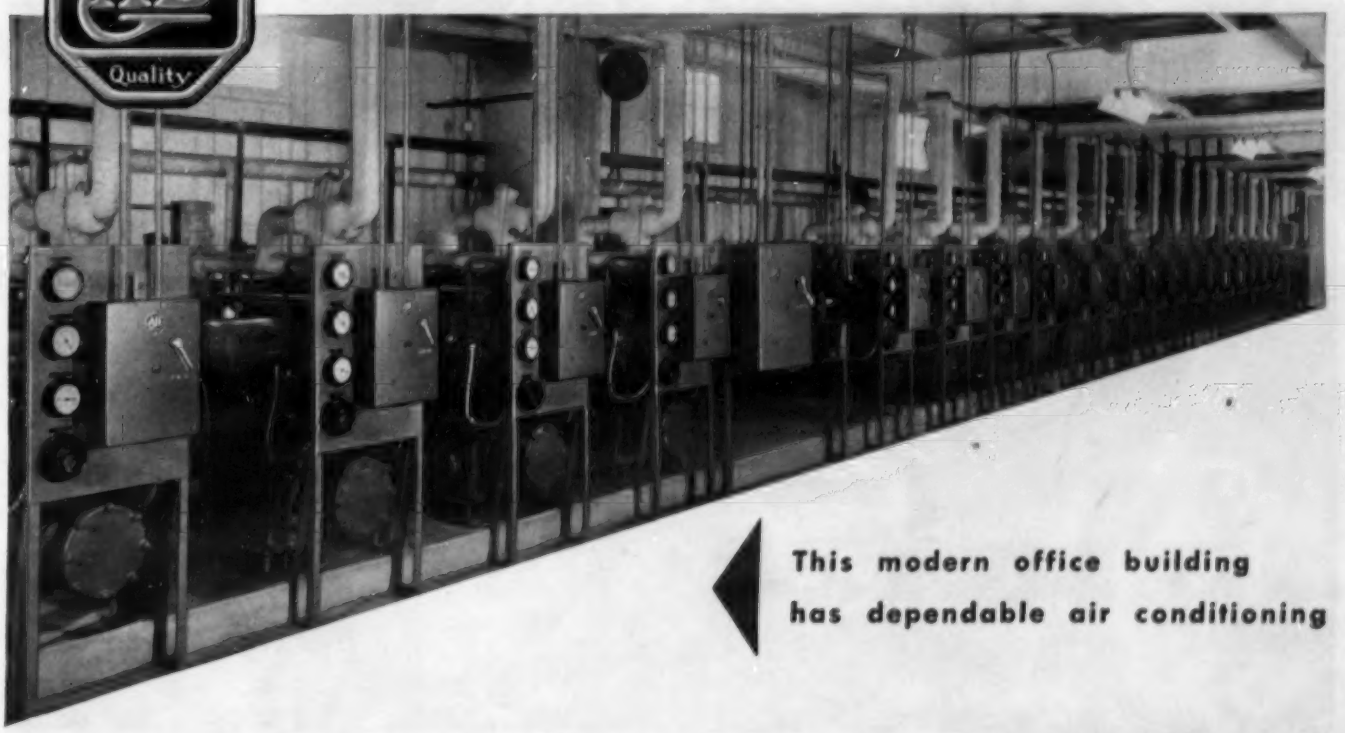
In addition to coordinating sales of Hupp products (air conditioning and heating equipment, appliances, electronics and communications devices, automotive and aviation components) throughout the free world, Hupp International will have jurisdiction of Hupp Nederland NV; Apparatenbouw Nedalo of Hengelo, The Netherlands; The Gibson Refrigerator Co. of Canada, Ltd.; and the world-wide licensing operations of Hupp Corp.

Smith, newly-elected president of Hupp International, will be assisted by three vice presidents named to operate the new division: Roy Scantlebury, manager of export sales for Typhoon Air Conditioning Div.; Donald W. Milestone, export manager of Perfection Industries Div.; and A. R. Cline, Jr., manager of international sales for Gibson Refrigerator Div.

Headquarters of Hupp International will be established in Cleveland. Scantlebury will establish and manage a New York office for Hupp International; Messrs. Smith, Milestone, and Cline will be located in the Cleveland headquarters office.


THE SIGN OF QUALITY MOTOR CONTROL

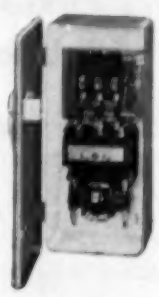
A-B Quality



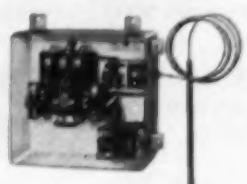
This modern office building has dependable air conditioning

TYPICAL ALLEN-BRADLEY CONTROL UNITS FOR AIR CONDITIONING & REFRIGERATION

Bulletin 712 Combination Starter with new visible contact disconnect switch.



Temperature Control Panel



ALLEN-BRADLEY SOLENOID MOTOR CONTROL Quality

...all compressors are equipped with

ALLEN-BRADLEY TROUBLE FREE MOTOR CONTROLS

The importance of "trouble free" operation is well recognized by air-conditioning and refrigeration equipment manufacturers. This is illustrated in the above picture which shows 20 of 41 air-conditioning compressors installed in a new office building . . . all equipped with Allen-Bradley controls.

The basic simplicity of Allen-Bradley solenoid starters is the reason for their outstanding reliability . . . there is only ONE moving part. No bearings or gimmicks to corrode and stick . . . no jumpers to break. The double break, cadmium silver alloy contacts never need cleaning, filing, or dressing . . . maintenance down time is eliminated, and so are "service calls." Dependable overload relays that maintain their accuracy indefinitely protect motors against burnout.

Specify Allen-Bradley "Quality" motor control . . . you will never have reason to regret your decision. Please write for your copy of the latest Allen-Bradley Handy Catalog, the 132-page guide to trouble free a-c and d-c motor control.

Allen-Bradley Co.
1313 S. First St., Milwaukee 4, Wis.
In Canada—
Allen-Bradley Canada Ltd., Galt, Ont.



AIRO stands for

Speedy, dependable, world-wide service.
Air Conditioning and Refrigeration parts, equipment, supplies.
Write for Wholesale Catalog No. 56

AIRO SUPPLY CO.
2732 N. Ashland Ave., Chicago 14, Ill.

*Panel Standardization Seen*

# Home Air Conditioning Control Panel Assembly Plant Engineers Panels To Meet Slight Wiring Differences

MINNEAPOLIS — Establishing its own residential air conditioning control panel assembly plant here has made possible mass production techniques and standardized operations for the Minneapolis-Honeywell Regulator Co.

The plant produces custom engineered panels to meet slight differences in wiring configurations as required by equipment manufacturers' individual needs.

VERSATILE test unit built by a Minneapolis-Honeywell engineer provides rigid yet quick check of electrical characteristics of this Honeywell W212 panel and various other types being mass produced in the firm's panel division factory.

WIRE STRIPPER capable of cutting and stripping leads and stamping a number on each for identification produces 17-in. lengths at a rate of 1,500 pieces per hour. Automatic machine was recently installed by Honeywell in its panel production plant to provide wire leads for use in air conditioning control panels.

### *'Interim Move Toward Full Standardization of Panels'*

"This plant represents an interim move toward the complete standardization of panels, which the industry will ultimately accept," states Dick Locke, air conditioning manager for the residential division of the company.

He pointed out that the plant is responsible for all phases of production from the original interpretation of specifications and development of practical control assemblies to the packing of finished units for shipment.

FINAL ASSEMBLY of M-H W-400 control panels is handled by skilled workers, one of whom is shown here placing a cut out-cut in pressure controller inside the case. Inside installation of unit is new—and advance to improve efficiency and reduce the cost of control units.

Beyond assembly of controls and components, it is also responsible for the design of relays, switches, and transformers.

### *Standard Cabinets Are Adaptable to Variety Of Control Requirements*

Tooling and light metal manufacturing facilities produce cabinets in standard sizes but which are adaptable to a variety of control requirements.

Transformers are mass produced at a rate of 5 to 6,000,000 a year in departments employing latest automation techniques, flexible production practices, and close control of operations, Locke said.

Typical of the innovations used in the plant is a wire stripper capable of cutting and stripping leads and stamping a number on each for identification. The leads are produced in 17-in. lengths at a rate of 1,500 pieces per hour with only occasional surveillance by a machine operator.

Another advance is installation of a cut out-cut in pressure controller inside the panel case to improve efficiency and reduce costs.

## *Wagner Tool Forms Watsco Distributors*

HIALEAH, Fla. — Formation of a new sales company, Watsco, Inc., to distribute the products of Wagner Tool & Supply Co., was announced recently by William Wagner, president of both companies.

Increased sales and wider distribution of "Watsco" refrigeration and air conditioning parts and supplies necessitated the formation of the new company, Wagner said.

The sales company and the manufacturing company are both headquartered at 1020 E. 15th St. in Hialeah, a Miami suburb. The manufacturing company was moved here last April from Long Island City, N. Y. About half the company's employes made the move with the firm.

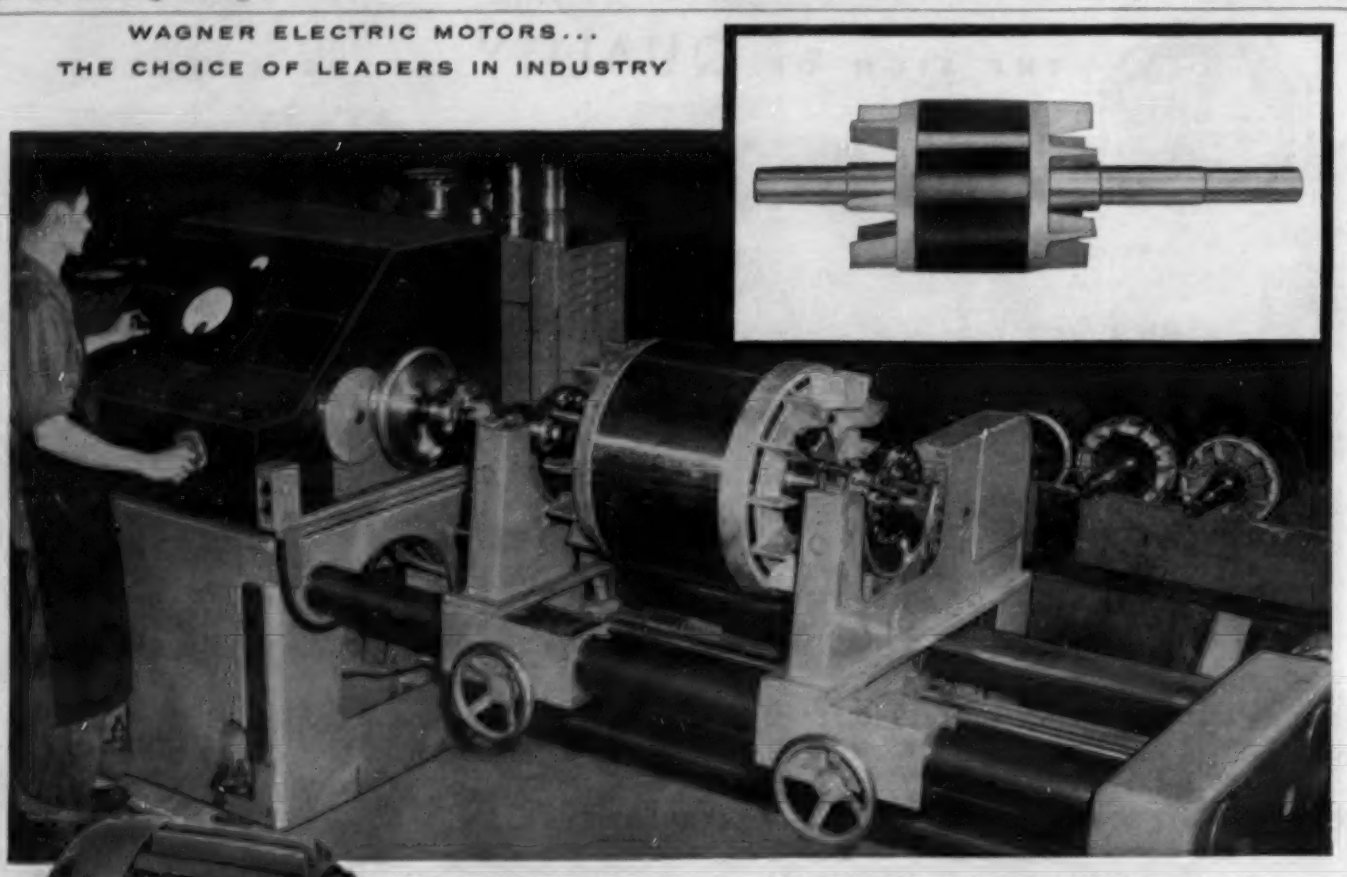
The new plant is air conditioned and has more than 6,000 sq. ft. of manufacturing space. Another 4,000 sq. ft. is devoted to executive offices, public rooms, clerical space, and employes' lounge.

Besides Wagner, other officers of the new sales company are George Iskyan, vice president; Stuart Wagner, secretary-treasurer; Jack Chorost, credit manager; and L. K. Steiner, advertising manager.

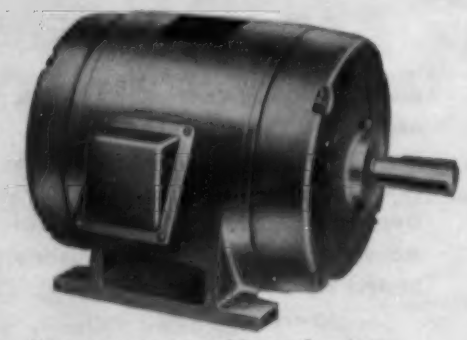
Several new products are in the development stage and will be released to the trade in the near future, according to Wagner.

Service tools currently being produced include the Watsco terminal seal to stop refrigerant leaks on hermetic units, a combination strainer and capillary tube called "Strain-O-Kap," and a "Line Tap" valve that will withstand vibration and will not mutilate the tubing to which it is affixed.


WAGNER ELECTRIC MOTORS...
THE CHOICE OF LEADERS IN INDUSTRY



Wagner totally-enclosed fan-cooled motor. 1 through 30 hp, NEMA Frames 182-326U.



Wagner open type drip-proof motor. 1 through 30 hp, NEMA Frames 182-326U.

**All Wagner Motors are *DYNAMICALLY BALANCED* for smooth performance**

Motor balance is important to fine machine and equipment performance. A well-balanced motor greatly reduces vibration—allows your equipment to operate smoothly and quietly.

*Every rotor*, even in the smallest fractional hp rating, used in a Wagner Motor is dynamically balanced on balancing machines like that shown above.

Your selection of Wagner Motors for your applications gives you other benefits, too. You can specify totally-enclosed motors that are fully protected against damage from filings, chips, dirt, fumes, moisture; or open type drip-proof motors—in ratings through 500 hp. Wagner Motors are *known* for dependable performance . . . they assure freedom from costly motor maintenance and even more costly motor failure. And—you have motors that can get on-the-spot service when needed—anywhere in the United States.

M56-9A

Wagner Electric Corporation
6441 Plymouth Ave., St. Louis 14, Mo., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC




*For more information about products advertised on this page use Information Center, page 34.*

# 2 Piston Bores Finished At Same Time by Horizontal Plane Hone

HORIZONTAL machines with two opposing spindles permit two piston bores to be honed simultaneously on this Micromatic model 523-2 "Hydro Honer" in Tecumseh Products Co. plant.

TECUMSEH, Mich.—A two-hole, horizontal plane hone which finishes piston bores in twin-cylinder refrigeration compressor crankcases at the Tecumseh Products Co. plant here, has served to "speed up" one of the traditionally "slow spots" in the production line.

### *Thought To Be First Use In Compressor Mfr.*

The use of the Micromatic Hone Corp. horizontal plane hone is thought to be the first in the industry.

The two piston bores in each crankcase are located opposite each other, but lie in two different horizontal planes. To permit the two bores to be honed simultaneously, horizontal machines with two opposing spindles are used.

### *One Crankcase Honed While Other Is Loaded*

By utilizing two fixtures on a rotary indexing table, one crankcase is honed while another is being loaded.

While the three basic types of Tecumseh compressors have crankcases similar in design, the piston bores come in four diameter sizes—1.312 in., 1.375, 1.500, and 1.625 in. When a run of crankcases of different piston bore diameters is desired, only the tools and gauge rings are changed—a switchover taking five seconds. The honing cycle is approximately 18 seconds, including the fixture indexing time.

### *Piston Selectively Fitted to Honed Bore By Close Tolerance*

The piston is selective-fitted to the honed bore to a tolerance of .0001 in. This accuracy results in a running seal which company officials say is so effective in preventing gas leakage that no rings are required on the piston.

# *Refrigerants, Oxygen, Acetylene Available By Overhead Lines In Air Conditioner Plant*

STAUNTON, Va. — Refrigerants, oxygen, and acetylene flow through overhead lines to various points of use at the new air conditioning plant of Westinghouse Electric Corp. here.

According to Clifford Sayre, manufacturing manager, "The familiar dual-cylinder handcart is gone from our manufacturing operations. Oxygen and acetylene are now as available and convenient to use as other service facilities such as electricity."

Oxygen is delivered in liquid form by tank truck and transferred to a 100,000-cu. ft. capacity spherical tank located outside the plant. The liquid oxygen is converted to gas at 60 p.s.i. pressure and is then piped into and through the plant to various points of use.

Acetylene is supplied by two 500-lb. automatic carbide generators housed outside the plant in a self-contained fireproof building. This gas is piped through the plant at 15 p.s.i. pressure.

Both refrigerants 12 and 22 are used in Westinghouse air conditioning units. The fluids are purchased by the carload, each car containing 15 2,000-lb. containers. These are unloaded at the receiving end of the plant and placed in racks adjacent to the pumping equipment.

The refrigerants 12 and 22 systems each consist of a double, thermostatically-controlled heated cradle, a diaphram-type pump and a scavenger pump for reclaiming the residue fluid in the 2,000-lb. containers. From the containers, the refrigerant is piped through overhead copper tubing to the accumulators located next to the automatic changing stands.

In the 12 system, the refrigerant is pumped from the cradles to the accumulator at 215 p.s.i. pressure and from there to the charging stand at 215 lbs.

In the 22 system a pressure of 215 lbs. is maintained in the line to the accumulator and 300 lbs. from there to the charging stand.

### To Cool Fla. Mansion

TALLAHASSEE, Fla. — The State Cabinet has authorized J. P. Carlile, contractor who is building the new Governor's mansion here, to increase his contract by $24,722 to cover costs of air conditioning and installing an elevator.


Increase COOLING TOWER EFFICIENCY With ASPIR-JET

Aspir-Jet, the new spray nozzle, increases efficiency of cooling towers by increasing water break-up and improving water distribution. This is accomplished by the Aspir-Jet unique design which atomizes the water with as little as one-half pound nozzle pressure. Formed of butyrate plastic, Aspir-Jets last longer because they do not corrode. Thousands already in use are giving better cooling even with lower than normal pressures.

• Available through Refrigeration and Air Conditioning Wholesalers.

Manufacturers & Refrigeration Wholesalers: If you are not now using or stocking this astounding new product, wire or write

THERMAL AGENCY
National Sales Agents
1515 DALLAS • HOUSTON, TEXAS



New McIntire DC FILTER-DRIERS with PERMASORB

give 3 TIMES More Protection

**Now**—buy the same size DC Filter-Drier as before, pay the same price—but get *triple* drying and filtering protection.

**300% more drying capacity**—3 times greater protection against moisture, acids and system failures because it is charged with the sensational new PERMASORB desiccant.

**PERMASORB** is a blend of drying agents designed to give maximum balanced drying at high, low and minute concentrations of moisture over the entire range of liquid line temperatures.

ADVANTAGES

- 3 times more drying capacity.
- Need not be installed in cool location—holds moisture under all refrigeration conditions.
- Ideal for extra-low temperature jobs.
- Neutralizes acids quickly.
- Best for all refrigerants—a must for refrigerant 22.
- Will not break down under extremes of moisture or acid.
- Dries super-fast, gets systems operating promptly.

ASK YOUR WHOLESALER FOR DC FILTER-DRIERS WITH PERMASORB
Install them for faster drying, longer protection, fewer callbacks, bigger savings.

THE McINTIRE COMPANY, Livingston 11, New Jersey

Since 1925 DFN DRIERS • FILTERS • STRAINERS


*For more information about products advertised on this page use Information Center, page 34.*

## Lewyt Research Laboratory Seen As Key to Firm's Future Success

WHILE chief product engineer Bernard Grill, seated, operates multiple point recording indicator in calibrated calorimeter room at the Lewyt Air Conditioner Corp., Irving Bottner, vice president, left, and Alex Lewyt, president, watch a test of a built-in wall air conditioner. Testing equipment was designed and built by Lewyt to test a cooling machine's reaction to any kind of weather condition.

LONG ISLAND CITY, N. Y.—New research and development laboratories in the Lewyt Air Conditioner Corp. plant here are the keys to the company's future success, according to Alex Lewyt, president.

Lewyt recalls that it took a two-year development and design program to produce the built-in wall air conditioner that is now produced in three different models by the company.

As an example of what went into the testing of the built-in unit, Lewty noted that more than 150 paints were tested to determine their durability. Durability is considered important because the built-in unit is installed permanently and is expected to give years of dependable service without removal.

As a result of this and other testing, Lewyt developed a shell casing and rear louver plate constructed from corrosion resistant zinc-coated steel, Bonderized, and enamel covered.

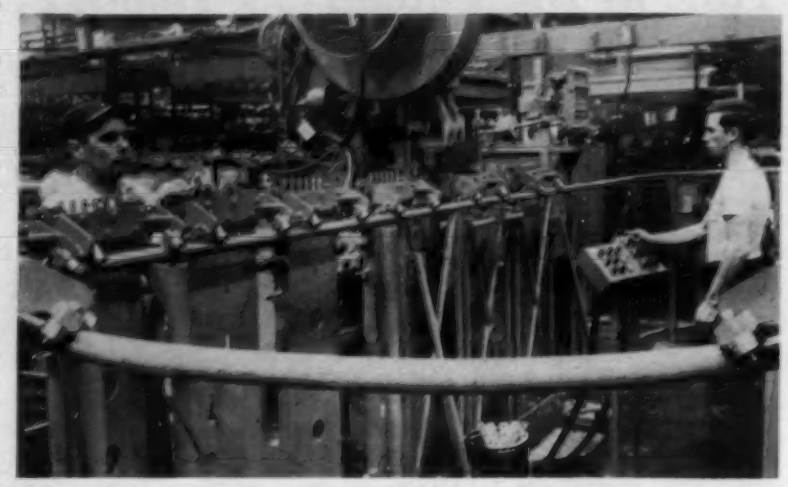
In developing the built-in air conditioner, Lewyt designers were given an over-all depth of 15 in. to work in. This depth was selected so that the conditioner could be placed in a wall with practically no overhang.

Thus limited, engineers paid special attention to smaller components that would give no loss in capacity or quality.

Lewyt's new laboratories contain a calibrated calorimeter room housing equipment able to test a cooling machine's reaction to any kind of conditions.

They also include a temperature room where temperatures may be controlled to extreme high or low levels.

## Carrier Cuts Production Time On Finned Heating Coils by 60%



CARRIER operator loads tubes with bullet-nosed inserts into fixture which is automatically positioned to receive stamped heating coil fins. Bullet nosed guides fins into fixture.

SYRACUSE, N. Y.—Production time on finned heating coils has been cut 60% at Carrier Corp., by combining high-speed stamping and assembly. A 52-in. coil with 676 fins is finished completely every 2 minutes and 6 seconds. Condenser and evaporator coils can be produced in the same way, the company said.

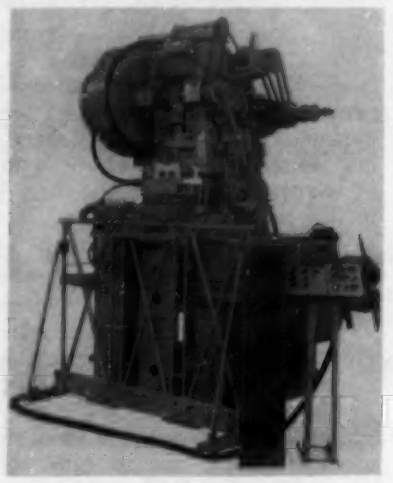
Key element in the new method is a 30-ton Precision "Flexopress" fitted with a five-station progressive die and a fixture that permits stacking fins 13 to the inch on tubes as part of the stamping operation.

The fixture is adjustable for coils of varying lengths. Operation is completely automatic.

The Flexopress, a high-speed stamping press, turns out self-spacing aluminum fins at a rate up to 300 per minute and automatically places them on tubes that are held vertically.

Fixtures accommodate any length tube up to the maximum for which they are designed, in this case five different sizes with the largest 52 in. long. Material for fins is held in double automatic uncoiler.

Formerly, the fins were stamped, then stacked or ganged, placed in nests, and tubes later inserted. With the new method, tubes capped with bullet-nose inserts, are loaded vertically in the fixture which locates and clamps them accurately underneath stamping die.



FRONT VIEW of Flexopress showing fixture in position to receive stamped heating coil fins. Note fully loaded fixture on right. Fixtures are adjustable for coils of various lengths. Pictured is a 52-in. coil.

Press immediately starts to stamp fins and stack them onto the tubes. Flanged extruded holes make fins self-spacing. Machine automatically counts fins, stops at proper number.

Then fixture is automatically unclamped. The shuttling mechanism which removes the loaded fixture brings a new fixture with tubes into loading position.


give your customers Ready-Power

NATURAL GAS air conditioning

economical
automatic
dependable

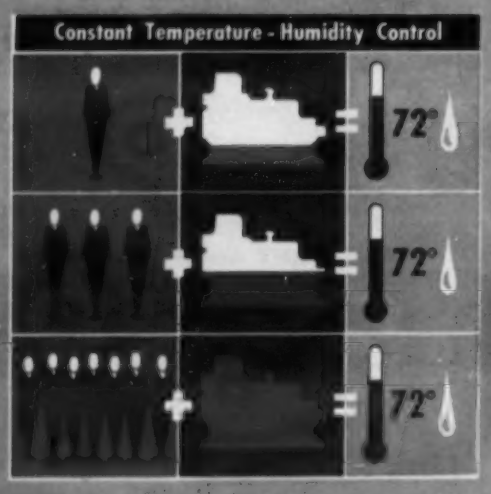
For Office Buildings | For Restaurants | For Churches | For Theaters

Call for Ready-Power Natural Gas Air Conditioning Units and give your customers the advantages of air conditioning at its best. Designed and engineered to operate efficiently on economical natural gas, Ready-Power Air Conditioning Units give controlled summer temperature and humidity at *lowest operating costs known.*

Ready-Power Units feature a unique system of capacity modulation which permits *continuous* operation of the compressor at variable speeds. Cooling rate and power requirements automatically adjust to changing load conditions. Temperature and humidity variations common to "on and off" systems are eliminated. Ideal for theaters, restaurants, motels, hospitals, churches and store and office buildings where latent and heavy sensible loads must be met.

Ready-Power Air Conditioning Units are available up to 76-ton capacity, and many multiple unit installations of more than 150-ton capacity have been operating for years. Units are designed to operate with chiller or direct expansion equipment. Pre-engineered Chiller Packages, available through Ready-Power, simplify and speed installation of complete air conditioning systems.

*Complete information is available. Write for it.*




READY-POWER
SAVES AS IT SERVES

THE READY-POWER CO.
11231 FREUD AVE. • DETROIT 14, MICH.

Manufacturers of Gas and Diesel Engine Driven Generators and Air Conditioning Units; Gas and Diesel Electric Power Units for Industrial Trucks.



If you have a VIBRATION problem VM can solve it!



• Spring Flex (Steel Spring) Vibration Mountings



• Vibration Hangers

• Combination Spring and Rubber-in-Shear

• Rubber-in-Shear



• Cork-Flex Mats

• RSH Rubber and Spring



• Shear-Flex Pads



• Integral fan and Motor Bases Available with Neoprene Mountings Spring-Flex Mountings and optional built-in one-piece motor slide base.

Other products available: Rubber-in-Shear Mountings and Flexible Hose. Special designs furnished to suit unusual job conditions.

Vibration Mountings Engineers are experts in finding the *right* solution to shock and vibration transmission problems. Their experience and VM's complete line of vibration control mountings and materials can increase your operating efficiency and save equipment and floors. Ask a VM representative to call or submit your problem to our home office.

*Specialists in Vibration Control for:*
FANS & MOTORS
REFRIGERATING COMPRESSORS
PUMPS — BOILERS
AIR CONDITIONING UNITS
SUSPENDED EQUIPMENT — PIPING
SHEARS — PRESSES — BRAKES

*Write for Bulletin VAC-11 "Vibration Isolation for Heating, Ventilating and Air Conditioning Equipment".*

If it's a vibration or shock problem get the right answer — quick — from



VIBRATION MOUNTINGS, INC.

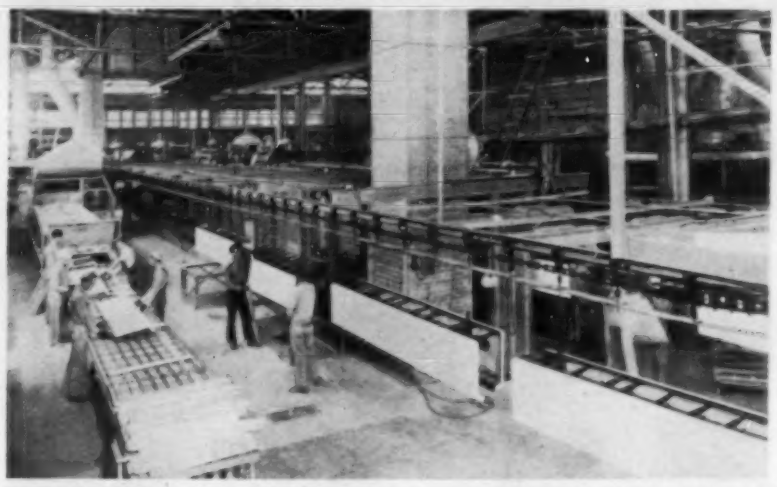
98-29 50th Ave., Corona 68, New York

*Representatives in Principal Cities of United States and Canada*




*For more information about products advertised on this page use Information Center, page 34.*

### Gradual Change Makes the Difference



CONVEYOR BELT at lower left corner of picture moves porcelain enamelled parts through oven at Warren Co., Inc. The gradual change of temperature as the pieces approach and leave the oven adds to the uniform quality of the finish. Temperature within the oven is more uniform as continual opening and shutting of doors is not necessary.

## Continuous Conveyor-Fed Porcelain Enamel Oven Ups Quality at Warren

ATLANTA — A continuous, conveyor-fed porcelain enameling oven adds greatly to the quality of all porcelain parts in commercial refrigerators manufactured by the Warren Co., Inc., says E. N. Barton, official.

Barton believes Warren is the only commercial refrigerator manufacturer with such a porcelain plant.

"After pickling," he explained, "the metal is mechanically sprayed on both sides and conveyor-fed through drying tunnels. There are two identical set-ups, one for the basic black coat and one for the two white finishing coats.

"At the end of the drying conveyors, the parts are placed onto the gas-fed oven's conveyor. The parts are fed slowly into the bright red inferno.

"This system permits a gradual heating of the metal, creating an ideal bond between the metal itself and the porcelain enamel. Emerging in the same slow fashion, the part is gradually cooled, further contributing to better quality."

In this type oven, which does not require any continual opening and closing of doors, there is much less variability in temperature, he added.

Perfect control of the baking time permits baking at a lower temperature, he explained. This is desirable, becausing baking at higher temperatures causes some larger enameling-steel parts to become wavy.

"The porcelain we use," Barton said, "even in our 'Coloramics' program, is genuinely acid resistant. It is not subject to marring from the normal food acids."

## Semi-Automatic Machinery Boosts Output, Uniformity at Larkin

ATLANTA — To meet the challenge of the expanding air conditioning and refrigeration industry, Larkin Coils, Inc. here has devised and is now using machinery which has greatly increased the company's coil production capacity.

Larkin has streamlined its operation by putting into service semi-automatic coil assembly machinery which not only permits increased production, but also produces more uniform coils, says O. M. Sims, president of Larkin Coils.

"Our semi-automatics assure absolutely flat fin surfaces without distortion in the fins," Sims says. "In addition, the machines assure positive fin to tube contact which results in a more efficient coil.

"Another advantage gained from this mass production method is a considerable reduction in cost. In spite of increases in material and labor costs, Larkin is able to produce a better coil at a lower cost than ever before," the executive continued.

Sims said that Larkin is now building additional coil assembly machines which will again increase production.

### *L.O.F. Appoints Donald J. Vild As Technical Service Engineer*

TOLEDO—Donald J. Vild, research engineer who has specialized in design of large air conditioning and heating installations, has been appointed a technical service engineer for Libbey-Owens-Ford Glass Co., it was announced by C. W. Davis, executive vice president-production and H. M. Alexander, general manager of research and development.

As a research engineer with the American Society of Heating and Air Conditioning Engineers' Research Laboratory in Cleveland for four years, Vild worked almost exclusively on research dealing with heat flow through glass. He is co-author of four technical papers dealing with heat transfer through fenestrations.

In the last year he was with the Austin Co., Cleveland, as an air conditioning design engineer.

"Vild will have as his major assignment for Libbey-Owens-Ford detailed studies of the effectiveness of Thermopane insulating glass in air conditioned buildings, and will also work with other LOF research sections on studies of light and heat transmission through glass chiefly in relation to air conditioning and heating problems," said Alexander, by way of explanation.

## Calumet & Hecla Of Canada Names E. W. Ervasti

DETROIT — Appointment of E. W. Ervasti as general sales manager of Calumet & Hecla of Canada Ltd., has been announced by John M. Dumser, director of sales for Wolverine Tube, Div. of Calumet & Hecla, Inc., and Calumet & Hecla of Canada Ltd.

E. W. Ervasti

Ervasti has served in various capacities with Wolverine for 18 years. He began his business career as secretary to the sales manager, was a manager of a product line, has served as a sales representative in both the Detroit and St. Louis area.

Ervasti is a member of the Tube Section of the Copper and Brass Research Association, the American Standards Association, and is present chairman of the Tubular Products Section of the American Refrigeration Institute.

### B-W Promotes McCall

YORK, Pa.—Donald A. McCall, director, community relations, York Div., Borg-Warner Corp., has been promoted to the position of staff assistant in the Management Training and Educational Services Dept. of Borg-Warner, Chicago.


**Back Pressure Regulators**

FOR CONTROLLING EVAPORATOR PRESSURE

Water Chillers • Food Refrigeration
Process Cooling • Air Conditioning

EXCLUSIVE V-PORTS
•
NON-CHATTER
•
COMPACT
•
HEAVY DUTY
•
FAST ACTING

| AVAILABLE CONNECTIONS ODS | FPT | Welding | Port Size | Tons @ 40° F. F-12 | F-22 | Ammonia |
|---|---|---|---|---|---|---|
| 7/8, 1 1/8, 1 3/8 | 3/4, 1/2 | 3/4, 1/2 | 3/4 | 2.0 | 2.7 | 7.0 |
| 1 1/8, 1 3/8, 1 5/8 | 1 | 1 | 1 | 3.8 | 4.9 | 11.0 |
| 1 3/8, 1 5/8, 2 1/8 | 1 1/4 | 1 1/4 | 1 1/4 | 6.0 | 7.8 | 20.0 |
| 1 5/8, 2 1/8, 2 5/8 | 1 1/2, 2 | 1 1/2, 2 | 1 5/8 | 10.7 | 14.0 | 36.0 |
| 2 1/8, 2 5/8 | 2 | 2 | 2 | 17.4 | 24.0 | 50.0 |
| 2 5/8, 3 1/8 | 2 1/2 | 2 1/2 | 2 1/4 | 23.0 | 29.0 | 60.0 |
| 3 1/8, 3 5/8 | 3, 2 1/2 | 3 | 3 | 44.0 | 60.0 | 140. |
| 4 1/8 | 4 | 4 | 4 | 85.0 | 115 | 250. |

FREON-12
FREON-22
AMMONIA

SPECIAL VARIATIONS
PNEUMATIC • ELECTRIC
COMPENSATED • REMOTE PILOT
DUAL PRESSURE • HOLD BACK

REFRIGERATING SPECIALTIES COMPANY
3004 W. LEXINGTON ST. CHICAGO 12, ILLINOIS
R S CONTROLS



*Announcing...*

NEW Paragon water spray defroster at

**55% SAVING**

Now Only $34.50

for • Locker Plants • Unit Coolers • Walk-in Boxes • Fur Storage • Breweries • Dairies

NEW WS24 gives you
✓ ONE DIAL
✓ ONE MOTOR
✓ NEW COMPACT DESIGN

YES, Paragon engineering advancements score again for you—3 important ways! (1) You get tremendous savings — *from $78.00 to $34.50.* (2) Only one dial and one motor. (3) New compact size saves 4½" in width over former model . . . makes WS24 easier to install. And, of course, you get Paragon's usual service warranty plus a nation-wide service organization. Order a stock of WS24's today from your jobber, or write Department 1687.

ONE CONVENIENT DIAL for setting frequency of defrost (1 to 24 cycles daily) as well as duration of cycle. Switch can be manually operated to check continuity of circuit. Heavy-gauge steel baked enamel case is 10¼" x 5⅛" x 4¼". Knockouts, both sides, bottom and back.

TWO SIZES: WS24 (120-v-60 cycle) $34.50
WS24-3 (240-v-60 cycle) $35.50

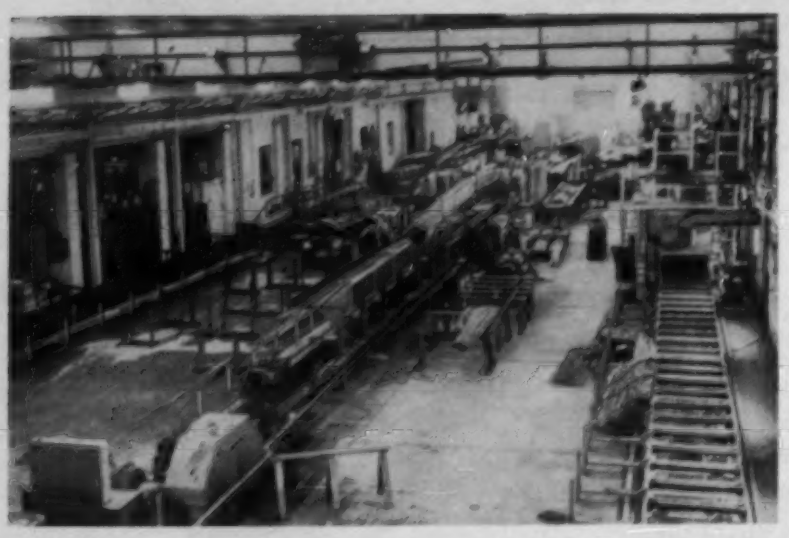
*Bank on Paragon Time Controls for all types of Air-Conditioning and Refrigeration Service*

COMMERCIAL DEFROSTER · DEHUMIDIFIER TIMER · 7-DAY CALENDAR DIAL TIME SWITCH · FAN TIMERS

*Let us send you data on all these dependable, accurate Paragon time switches — write*

**PARAGON ELECTRIC COMPANY**
1712 TWELFTH STREET • TWO RIVERS, WISCONSIN
WORLD'S FOREMOST MANUFACTURER OF TIME CONTROLS

# Condenser Manufacturer Operates Own Brass Mill



HAVING its own copper mill, complete with extrusion press and draw benches, Halstead & Mitchell claims it is the most completely equipped manufacturer in the industry.

## *Closer Quality, Cost Control and Greater Independence Gained*

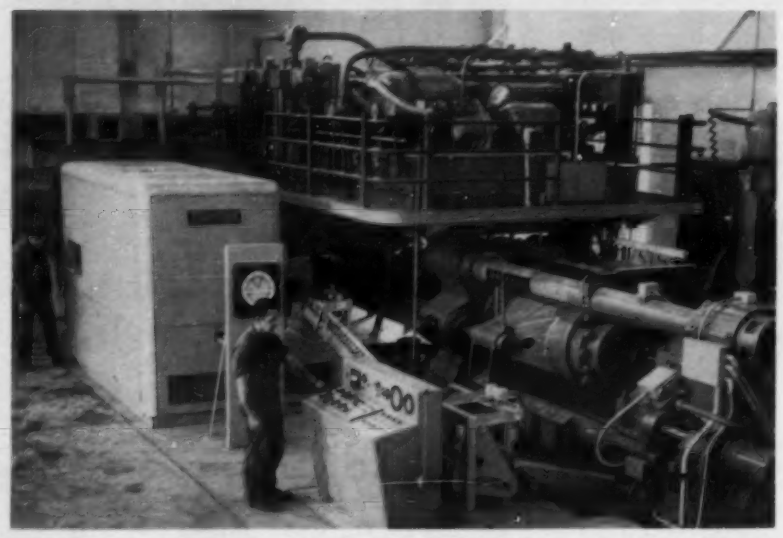
PITTSBURGH—Which is the most completely equipped and tooled manufacturer in the industry?

This question is probably debatable, but one firm, and a relatively small one with 251 employes, puts forth strong claims for this honor.

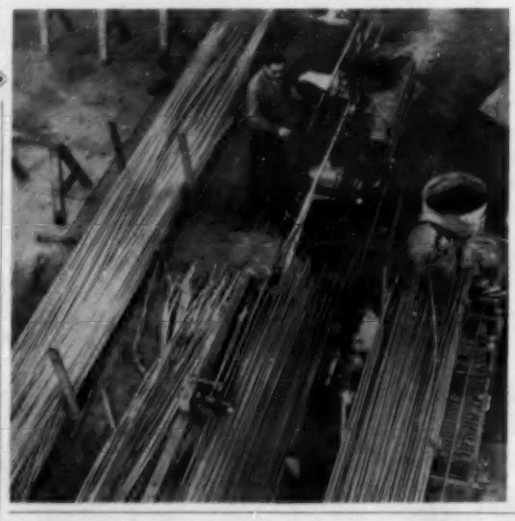
Halstead & Mitchell, producer of air and water-cooled condensers and cooling towers, all but begins at the mine with its manufacturing processes. In recent months the company completed the installation of its new copper mill at its Zelienople, Pa., plant. Now its condensers start out as 7-in. copper billets.

For quite some time the company has been operating its own draw benches to produce the copper tubing it uses in its condensers. With the recent addition of its own extrusion press, however, Halstead & Mitchell has gone another step beyond that. Its operations start with the copper billets which are extruded in the big press and then put on the draw benches.

An extensive user of brass, which is milled to form the headers of its water-cooled condensers, the company also employs the new press to extrude its own brass bar stock.



EXTRUSION press lets Halstead & Mitchell start production of air and water-cooled condensers with 7-in. copper billets. Press is also used to extrude brass bar stock for condensers.



BETTER control over tolerances and costs is achieved by operating its own copper mill, Halstead & Mitchell believes.

### *Copper Mill Gives Firm Self-Sufficiency*

The copper mill is probably the most outstanding example of the company's emphasis on tooling and equipment, and the desire of Byron Halstead, senior partner, to be "as self-sufficient as possible."

The company's capacity for processing copper tubing is being increased from the present four million pounds to 30 million pounds a year, Halstead has indicated.

Today's facilities for production of Halstead & Mitchell's cleanable water-cooled condensers permit a capacity of 2,000 a day—enough to supply the world's current needs in less than six months, the company says.

Similarly, Halstead says the tooling for the firm's cooling tower line will let it produce an annual volume equal to the combined production of the 23 leading manufacturers in 1955.

This is achieved by such tools as an Esterer reciprocating gang saw imported from Germany which can convert a million board feet or more of lumber a month into wooden slats which serve as the fill in its towers.

Latest expansion move of the company is only one in a series already programmed, according to Halstead.

"In order to exceed the pace of the air conditioning and re-

*(Concluded on next page)*

Long life . . . quiet operation . . . high operating efficiency . . . lasting good appearance — these sales-stimulating motor advantages are assured your product when it is teamed with a Lamb Electric *super* shaded pole motor.

Reflecting our 41 years of experience successfully powering many types of household appliances, these advantages result from the following features:

- UNI-SPUN* STATOR FRAME for maximum rigidity
- HIGH DIELECTRIC slot insulation and extra varnish treatments
- AL-SPUN* ALUMINUM ROTOR CAGE for maximum conductivity
- DIE-CAST END FRAMES . . . sturdy, lightweight, corrosion-resistant
- BEARINGS widely spaced, amply dimensioned
- AMPLE OIL RESERVOIR . . . positive oil circulation
- SHAFT precision ground to controlled surface finish
- MOUNTING absorbs vibration
- ADVANCED DESIGN, quality materials, and up-to-date manufacturing methods
- FINISH . . . moisture and abrasion-resistant

Our district engineers will be glad to demonstrate the advantages of Lamb Electric *super* shaded pole motors for *your* products.

*Reg. U. S. Pat. Off.

THE LAMB ELECTRIC COMPANY • KENT, OHIO

In Canada: Lamb Electric—Division of Sangamo Company Ltd.—Leaside, Ont.

Lamb Electric

SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

UNI-SPUN* STATOR FRAME
Anchored laminations, ample back iron, strong pole tips mean core rigidity, better heat dissipation, quiet operation.
AL-SPUN* ALUMINUM ROTOR CAGE
Heat-treated for lowest rotor losses. Integral cooling fan and vented core. Dynamically balanced.

When your problem is...
SIZE...SHAPE or METAL
your answer is
DEAN
COLD PLATES
"Job Tailored" to your specifications
A baffling problem? Try a Dean Cold Plate made expressly to suit your particular requirements. Made in a variety of metals in cylinders, U's, angles, tanks, etc.
Many shapes
Many sizes
Many metals
DEAN PRODUCTS, INC. 1042 Dean St. STerling 9-5400 Brooklyn 38, N.Y.




*For more information about products advertised on this page use Information Center, page 34.*

CONVEYORIZED brazing rack for water-cooled condensers has a capacity of 150 per hour. Inner and outer copper tubes are simultaneously brazed to brass headers.

FINNED surface for its air-cooled condensers and other applications is made by Halstead & Mitchell in 30-ft. lengths and then cut to size as required.

GANG SAW imported from Germany cuts wooden slats for cooling towers at rate of 1,000,000 board feet a month. Extremely close tolerances are claimed for this reciprocal, 25-blade saw.

ELECTRIC WELDING of cooling tower cabinets is said to prevent vibration noises that might result with some other form of fastening.

# Special Machinery Aids Tower Output–

*(Concluded from preceding page)*

frigeration industry, our program calls for a step-up of three times within the next few years," he says.

The firm's desire to "exceed the pace" of the industry is explained by Halstead:

"There has been a growing tendency in recent years for manufacturers to buy more and more components rather than produce their own. One of the problems with our condensers in the eyes of manufacturers was the lack of a second source. So we had to bend over backwards to get capacity."

This philosophy was largely responsible for the company's decision to have its own copper mill. Moreover, drawing its own copper tubing, Halstead believes, gives the company better control over tubing dimensions, and, of course, production costs.

Latest expansion move gives Halstead & Mitchell a plant covering 135,000 sq. ft., and land has been purchased for an additional 250,000 sq. ft. of production area. The firm's first building in Pittsburgh, occupied in 1944, had only 6,000 sq. ft. of manufacturing area. Manufacturing was moved to Zelienople in 1947 when the firm built a 10,000-sq. ft. factory.

### *Develops Own Tools*

In its manufacturing processes the company has developed most of its own tools, either by actually making its own or adapting tools available to meet its special requirements.

The copper tubing draw benches, for example, are similar to those used by tubing manufacturers but have been simplified in some respects to fit into the Halstead & Mitchell operations. Two draw benches are employed, and they have a combined capacity of 2,600,000 ft. of tubing per month. One bench handles five tubes at a time; the other, three.

Manufacture of the company's water-cooled condensers is performed largely on a mass-production basis, the most noteworthy example of that probably being the conveyorized brazing rack. Here the double tubes forming the condenser are brazed at a rate of 150 per hour to headers milled out of brass stock.

In the first year, 1945, the company reached a peak rate of 50 a day.

As a producer of water-cooled condensers, Halstead & Mitchell was quick to realize in the late Forties that water shortages could well lead to restrictions on water used for condensing, so it moved into the manufacture of cooling towers.

In an unusual step the company broke with the established practice of using redwood for tower fill and began using pressure-creosoted wood, placing a 20-year guarantee on the wetted deck surface against rotting or fungus attack.

To facilitate cutting the cooling tower fill slats, the company imported an Esterer gang saw from Germany. This is a reciprocal saw with 25 blades and can handle a million board feet of wood per month. Operated by 75-hp. drive motor, with another 25 hp. in auxiliary equipment, it will split four 2 by 12-in. boards simultaneously on a continuous flow operation.

Much more accurate cuts are obtained with this reciprocal saw than with conventional rotary gang saws.

Another important piece of wood-working machinery employed in cooling tower production is a five-bladed dado notcher which prepares the wood used as horizontal dividers in the wetted deck of the tower. This machine was designed and built by Halstead & Mitchell.

After the wood dividers have been notched on this machine, they are put through a four-bladed rotary rip saw for cutting to final size.

Cabinet of the towers are of all-welded steel construction, a design which is claimed to eliminate possible noise due to vibration which might result with some other form of sheet metal fastening.

### *Air-Cooled Condenser Production Set Up*

Air-cooled condensers represent a comparatively recent addition to the firm's line of products. As with its other products Halstead & Mitchell attempts to be as self-sufficient as practicable in their manufacture. A bank of three machines is now in operation turning out finned surface (aluminum fins on copper tubes) used in the air-cooled condensers.

Basic design of the finned coils, however, permits them to be used as evaporators for air conditioning or refrigerated fixtures or blast heating coils in addition to their application in air-cooled condensers.

These finned coils are produced in basic lengths of 30 ft. in four, five, or six-tube one-row sizes. From these basic sizes, various coil arrangements are made by cutting the basic "stock" into lengths as required by the application and attaching return bends to build depth and height to specifications.

Halstead & Mitchell's finned coils are manufactured under a licensing agreement.


**RECTORSEAL No. 2**

**highest quality sealant**
**lowest cost**
**finest package**

What a combination to beat. Nothing has been spared to make Rectorseal No. 2 the finest compound available for preventing leaks on refrigeration installations. Yet the price is from 20% to 40% lower.

The handy tube has a nozzle tip applicator for easy, clean application. Each tube individually packed in a sturdy cylindrical screw top fiberboard carton.

Thin in the tube, Rectorseal No. 2 spreads smoothly without waste. It thickens to a plastic elasticity in the joint to positively seal against leaks. Insoluble in all refrigerants (gas or liquid) and in oil and water.

Write today for generous free sample of Rectorseal No. 2.

**RECTORSEAL Dept. Z**
**2215 Commerce Street, Houston 2, Texas**

RECTORSEAL
NUMBER TWO



There's nothing like high reserve capacity!

PA® 400 has the highest capacity for moisture adsorption under the most adverse conditions in refrigerator operation . . . higher than any other desiccant. This reserve capacity is a safety factor. PA 400 keeps the refrigerator running even though there is sufficient moisture in the system to completely "saturate" other desiccants.

No other refrigeration desiccant gives you as much as PA 400 . . .

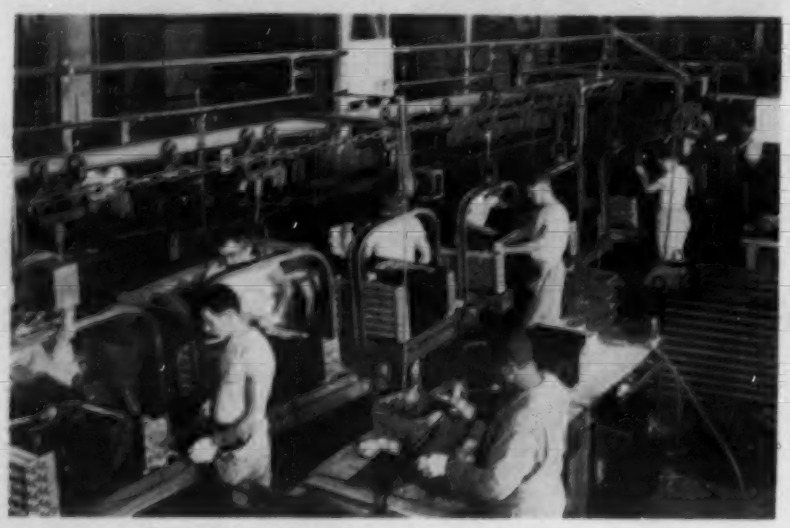
- Highest capacity
- Minimum pressure drop
- Physical adsorption not chemical action
- Non-dusting
- Adsorbs acids
- Dries refrigerants to below 2ppm at 120° F.
- Non-deliquescent
- Does not channel

Progress Through Chemistry

**DAVISON CHEMICAL COMPANY**
*Division of W. R. Grace & Co.*
**Baltimore 3, Maryland**
Producers of: Catalysts, Inorganic Acids, Triple Superphosphates, Superphosphates, Phosphate Rock, Silica Gels and Silicafluorides. Sole Producers of DAVCO® Granulated Fertilizers.


*For more information about products advertised on this page use Information Center, page 34.*

# Mechanized Assembly Track, New Processing Operations Speed Up Room Conditioner Line



VIEW of overhead assembly conveyor where motor, baffles, fan, blower wheel, and electrical controls are assembled to Frigidaire window unit.

DAYTON—Frigidaire Div. of General Motors Corp. recently completed a modernization program which provided a mechanized assembly track and a number of important new processing operations on its window air conditioner line.

Previously, Frigidaire assembled their units on a roller gravity conveyor track. With this type of operation, the rate of flow depends on any one of the production operators. It quite often results in an uneven grouping of operations dictated by the slowest employe.

The new system developed by Frigidaire engineers provides an overhead chain conveyor line on which the units are suspended in carriers and all assembly and processing operations are done.

The unit remains in the carrier from the first operation until after performance test, where it is transferred to a powered slat conveyor for cabinet assembly and crating.

The type of layout made possible by the use of the overhead conveyor permitted facilities to be installed for a capacity of more than twice as many units per day on the same floor space as the old roller gravity track.

Three major processing developments were included.

Now, the component parts of the unit are dried within strict limits on equipment using infrared heat and blowing low pressure dry hot air through the refrigerant passages. Time is reduced to a five-minute cycle. The drying equipment is placed along the line to feed the components while still hot directly to the point of unit assembly.

The old system for evacuation of the unit prior to charging consisted of a number of stationary drops along the roller.

### *Unit Evacuated While Moving on Conveyor*

Now, a 50-ft. diameter rotary vacuum wheel is synchronized to the conveyor and the unit is evacuated to a pressure of less than 100 microns while moving on the conveyor. This equipment was installed to release needed floor space.

Here again, the constant speed of the power conveyor plays a part in quality control. It is designed to provide a holding period of at least 50 minutes between vacuum and charging.

OPERATOR has removed a Frigidaire window unit evaporator coil from an overhead bank conveyor and placed it in the coil dehydration oven where coil is dried to strict limits. Coil is assembled to unit in foreground after drying and while still hot.

PERFORMANCE TEST inspector logs test data on Frigidaire room unit "travel card" as the product passes through a controlled temperature and controlled voltage zone. Here temperature depression and wattage are automatically checked and recorded on instrument charts.

Close control of the performance test is also an important part of Frigidaire's quality control program. In a restrictor type system such as the window unit, temperature variations have pronounced effect.

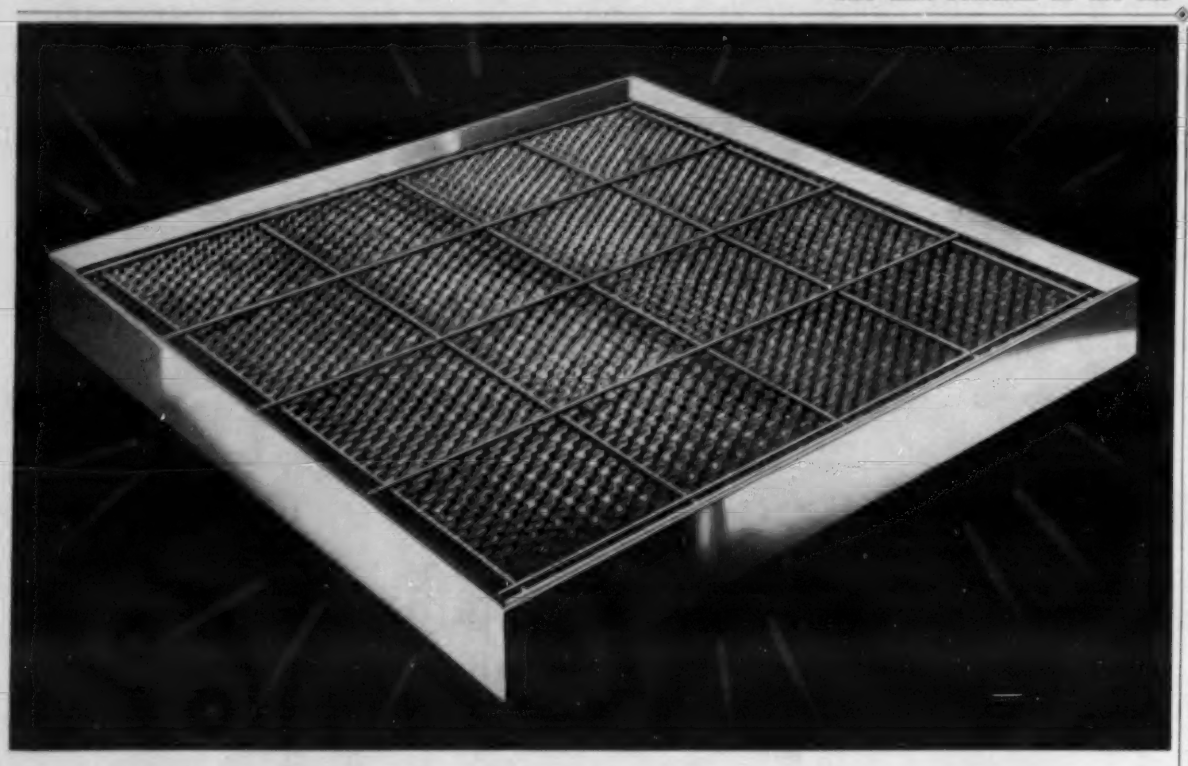
Temperature control in a test room full of air conditioners each discharging cool air on one end and hot air off the condenser on the other end is a difficult problem. This problem is further complicated by a varying load due to empty carriers.

### *How Test Room Temperature Control Is Achieved*

Sufficient air conditioning to meet peak loads must be combined with sensitive modulating equipment to adjust for lower requirements. Also, a rapid change of air throughout the test house is necessary to mix the many air currents.

A limit of 90° plus or minus 3° F. and 20-30% relative humidity is maintained during a 35-minute normalizing run-in period. Then a limit of 90° plus or minus 1° F. is maintained for five minutes before reading.

At the end of this time, the unit passes through a section where controlled voltage is applied and the wattage and temperature depression are taken automatically and recorded.

**You'll satisfy more people with EZKLEEN air filters!**

**PERFORMANCE**

E Z Kleens' unique design of multi-layered expanded alumaloy sheets, scientifically staggered to form thousands of adhesive-coated, dust-holding baffles, makes for extremely high efficiency, depth loading and low build-up resistance. E Z Kleens literally "scrub" the air clean . . . improve furnace or air conditioner operation and their washable feature eliminates danger of overworking equipment because of dirty filters.

**VERSATILITY**

Tailor-made for any type operation—E Z Kleens can be easily washed by the owner if desired . . . or they fit perfectly into a filter-service type business.

**ECONOMY**

Washable, aluminum E Z Kleens last for years and years. This long service period means sizeable annual savings compared to the cost of disposable filters that require replacing at least twice a year. Clean filters keep fuel and power costs down, too.

**CONVENIENCE**

E Z Kleens' washable feature eliminates tiresome shopping for new filters at frequent intervals. A few minutes to wash, re-coat and replace E Z Kleens . . . and they're good as new . . . an unusually important feature when special sizes are involved.

**ODOR REMOVAL, TOO**

E Z Kleen Air Filters can be made odor-removing too, in addition to their dust and dirt trapping capacity by simply substituting Super Filter-Coat (dust and odor-removing adhesive) for Filter-Coat (dust-removing adhesive) in the re-coating process.

RP . . . PRODUCTS OF RESEARCH

RESEARCH PRODUCTS CORPORATION

Dept. 20, MADISON 10, WISCONSIN

G&E

CATALOG ON REQUEST

Wholesalers of Refrigeration Supplies

G & E EQUIPMENT SUPPLY CO.

OGDEN AT FULTON

CHICAGO 7, ILL.

**Handy Tube Bender**

**Smoothly Bends any pipe or Tubing 3/8"-1 1/8" O.D.**

• Just a twist of the wrist assures perfect, even bends — right angle, any angle, U and offset. Save enough on ONE job to pay for your HANDY BENDER.

See your supply house—or write for free folder today.

HOLSCLAW BROS., INC.

428 N. Willow Road • Evansville, Indiana




*For more information about products advertised on this page use Information Center, page 34.*

## Dean Covers 'Job Tailored Cold Plates'

——KEY NO. R-1010——

BROOKLYN — Dean Products, Inc. announces a new technical data bulletin on "Dean Job Tailored Cold Plates" for cafeterias.

Bulletin 563, which contains color illustrations, shows how Dean "Snow Plates" produce a soft, snow-like frost that gives a selling background for food. Foods are shown displayed on actual cafeteria counters.

The new bulletin contains complete price schedules for Dean Snow Plate cafeteria counter displays completely built ready for installation, and also price schedules on refrigerated counter pans in stretch-out form for food service equipment fabricators.

One page of this bulletin is devoted to detailed drawings of architectural design information and includes specifications.

## Elkay Catalogs Moving, Shipping, Storage Supplies

——KEY NO. R-1011——

NEW YORK CITY—Elkay Products Co. announced the 1956 edition of its catalog of moving, shipping, and storage supplies.

Over 1,000 items are illustrated in the 72-page catalog. "One stop" source for all supplies of this type, according to Elkay, brings economy and convenience.

Dubbed "encyclopedia of the industry," the catalog shows wholesale net prices on complete lines of air conditioning and refrigerator delivery covers, appliance and hand trucks, and other items carried by the firm.

## Leak Detector Brochure Available

——KEY NO. R-1012——

FULLERTON, Calif. — A new six-page, illustrated brochure on the Beckman leak detector is now available from the Process Instruments Dept., Beckman Instruments, Inc. here.

Bulletin 483 contains the latest technical data on this versatile instrument as well as information on many applications.

The leak detector has been designed to locate minute leaks in pressure, vacuum, and hermetically-sealed systems and units.

Covered in the brochure are methods by which leaks may be detected and instrument specifications.

## Worm-and-Gear Speed Reducer Described

——KEY NO. R-1013——

CLEVELAND—Rampe Mfg. Co. recently issued an illustrated specification sheet describing the firm's "Economy" worm-and-gear speed reducers.

Model SW-1, with new glass fiber reinforced plastic case and nylon gear, is diagrammed with horsepower ratings detailed.

## Trane Revises 'Cold Generator' Bulletin

——KEY NO. R-1014——

LA CROSSE, Wis.—The Trane Co. has announced a revised "Cold Generator" bulletin covering its line of 10 through 150-hp. packaged, reciprocating water chiller units.

Trane manufactures 35 complete lines of air conditioning, refrigeration, heating, ventilating, and heat transfer equipment.

The revised bulletin includes:

New capacity tables on the company's 10, 20, and 50-hp. machines, which now have an internal fin extended surface arrangement allowing for maximum refrigeration capacity with smaller overall unit size.

New data on Trane 60, 75, and 100-hp. Cold Generators, which have been redesigned to use straight tube condensers with removable heads.

New information on chiller inlet and outlet water connections, which have been increased in size to gain the advantage of lower over-all water pressure drop through the chiller.

New and complete data on the two largest size packaged units—the 125 and 150-hp. machines.

## D-H Offers Data on Air-Cooled Condensers

——KEY NO. R-1015——

LOS ANGELES—New data information sheets on the complete line of Drayer-Hanson air-cooled condensers have recently been published by the manufacturer.

Graphic diagrams detailing typical wiring, multiple circuit, and outdoor installation are visual aids in the engineering piece labeled E.M.P.-56110. Table of dimensions and performance curves, as well as selection problems which have been worked out in step-by-step terms.

## Barnebey Tells How To Use 'Dacor' Filters

——KEY NO. R-1016——

COLUMBUS, Ohio — Literature on how to use "Dacor" air conditioner or furnace filters is offered by Barnebey-Cheney Co. here.

The new Dacor (Disposable Activated Charcoal Odor Remover) filter uses thin paper strips that are sprayed with activated charcoal to provide more exposed charcoal surface for quicker air freshening, according to the manufacturer.

Air resistance of Dacor is low and blower efficiency is not impaired, the firm stated.

## 'MTI' Industrial Cooling Tower Line Cataloged

——KEY NO. R-1017——

BALTIMORE — The Baltimore Aircoil Co., Inc. offers an 8-page catalog on their new "MTI" line of industrial cooling towers.

The "MTI" Cooling Tower is designed especially for industrial applications where process water temperatures are critical and must be accurately maintained. The units have a capacity safety factor to guarantee positive performance at any condition, the firm says.

The catalog describes in detail the 44 sizes available, and gives complete selection data in simplified form. "MTI" Industrial Towers are designed to meet nearly any approach or any range requirement in a single stage unit (down to 2° approach—as high as 70° range).

## Refrigerated Warehouse Directory Issued for '56

——KEY NO. R-1018——

WASHINGTON, D. C. — Now available, but said to be "going fast," are 1956 Annual Directory of Public Refrigerated Warehouses published by the National Association of Refrigerated Warehouses.

Offered at no charge, requests for copies of this Directory for the perishable food industry should be sent to NARW, Tower Bldg. here.

## Charts Highlighted In Water Coil Catalog

——KEY NO. R-1019——

LOS ANGELES—A new water coil catalog (No. 53c6a) which incorporates several charts that can be used by engineers in calculations for coil problems has been released by Refrigeration Engineering, Inc. here.

The charts include a complete table of nominal ratings for the 4, 6, and 8-row coils and further charts show when a coil is operating all wet, partially dry, and all dry.

The Los Angeles firm, which markets air conditioning and refrigeration equipment under the "Recold" trademark, also offers its chill water selection method, augmented by a visual application of this method with a chart to determine g.p.m./ circuit and head loss.

A new MTD Chart is incorporated in the catalog, a resistance to air flow chart, and a method of calculation for hot water coils.

$ELL
an ice making machine
with real SALES IMPACT!
Chip-Freeze
AUTOMATIC ICE FLAKER
A new 560 lb. daily capacity ice flaker that is fast becoming the number one salesmaker in restaurants, bars, hotels, soda fountains, groceries and all retail outlets that want and use ice making equipment. Here is the newest, the most scientifically designed unit on the market today. Easy to operate and trouble free, CHIP-FREEZE is priced below competition. Offer your customers the unit that is making sales history. Sell CHIP-FREEZE, the only ice flaker in its field that provides these outstanding sales features.
• FOR ECONOMY . . . Savings up to 95%. A full bushel of crystal clear ice flakes for as little as 2c or 6c per hundred lbs. (depending on local power and water rates). Pay only for the ice that you need. Low installation cost and easy maintenance makes CHIP-FREEZE the most economical unit on the market.
• FOR CONVENIENCE . . . New NO DEEP REACHING DESIGN places ice at waist level . . . right at your fingertips for instant serving. Easy to operate, this space saving unit automatically turns itself on and off and is ideal for any water system.
• FOR SANITATION . . . No possibility of accumulation of ice that leads to scum, dirt and decay. CHIP-FREEZE produces ice at the top of the unit and enables you to constantly draw clean fresh ice from the lower part of the upper section of the sanitary, stainless steel storage bin. Newly produced ice then falls into place . . . ready for serving.
• FOR BEAUTY . . . Beauty pays off in sales appeal. The attractive CHIP-FREEZE space saving cabinet is available in a wide choice of decorator colors to harmonize with any interior. Easy to clean hi-bake enamel finish retains its luster for the life of the machine.
Send for complete information and prices!
NO DEEP REACHING!
Sparkling pure ice is always at your WAIST LEVEL!
Gentlemen: AC&RN
I am interested in knowing more about CHIP-FREEZE Automatic Ice Flaker.
Name
Firm
Address Phone
City Zone State
COCORA PRODUCTS
Designed and manufactured by
COLD CORPORATION OF AMERICA
Manufacturers of Ice Making Equipment
1371-89 N. North Branch St. • Chicago 22, Ill. • Michigan 2-3016

# Light Aluminum In Refrigeration Offers Strength, Corrosion-Resistance

***By E. W. Mason, Head, Appliance Section, Sales Development Div., Aluminum Co. of America***

During the past 16 years, the production of aluminum in the United States has increased at a spectacular pace. Its rate of growth has outstripped the combined rate of all other industrial production in this country by more than 500%. The refrigeration and appliance industry has been quite active in creating the continually increasing demand for the light metal.

For decades, bright attractive aluminum, with its strong resistance to corrosion, has successfully met the strict requirements of domestic and commercial refrigeration. Approximately 30 years ago, the value of aluminum applications in commercial refrigeration was first realized when a major manufacturer of cooling coils for display cases adopted aluminum fins.

Another long-standing application is the aluminum housing that encases blower coils installed in walk-in and reach-in refrigerators. Both applications are of bare aluminum, and have given excellent service.

### *Average Refrigerator Had 18 Lbs. Aluminum In '55*

In 1955, some four million refrigerators were made and sold in this country. Each contained an average of 18 lbs. of aluminum. A survey of 46 leading freezer manufacturers conducted in 1955 revealed that 29 makers specified aluminum for tubing, shelves, and liners. Eight million pounds of aluminum were used in the manufacture of food freezers last year.

A RACK of formula bottles is placed in an all-aluminum nursery refrigerator in a new, modern hospital in the east.

The acceptance accorded aluminum by the refrigeration industry can be attributed to the metal's resistance to corrosion, strength, light weight, reflectivity, and pleasing appearance. Aluminum's ability to resist corrosion has been proved by extensive applications in many industries, and by exhaustive weathering tests in many parts of the world.

The range of attractive finishes with good resistance to corrosion that have been applied to aluminum refrigerator and freezer components extends from a natural finish to chrome plate. Even the as-fabricated surface of aluminum has shown good resistance to corrosion in the cool, moist atmosphere of a refrigerator. This is the finish found in many domestic freezers, commercial refrigerators and freezers, and dough retarders.

### *Anodic Coating Is Popular Finish*

A popular finish for aluminum applications in the refrigeration industry is an anodic coating. It exhibits excellent resistance to corrosion in humid environments, and it cannot chip or peel. Ice cube trays, shelves, evaporators, meat-keeper pans, hydrator pans for storage of fresh vegetables, freezer compartment doors, and butter keepers are commonly anodized.

Along with good resistance to corrosion, anodized finishes have almost unlimited color possibilities. One appealing application is color-finished aluminum for shelves and freezer compartments in domestic cabinets.

An anodized coating need not be thick to contribute its advantages. The "Alumilite 200" finish, applied to shelves, display case rub rails, and other lus-

*(Concluded on next page)*

### *Review of Alloys, Tempers In Aluminum Uses*

| Domestic Items | Alloy |
|---|---|
| Ice Cube Trays | 3003, 5005, 5052 |
| Evaporators | |
| Sheet | 3003 |
| Tubes, if used | 1100 |
| Shelves | |
| Stamped from sheet | 5050-H32, 5357-H32 |
| Riveted wire construction | EC-H19 (wire in frame of above alloys) |
| Hydrator & Meat Pans | 3003, 5005 |
| Freezer Section Doors | 5357, 3003 |
| Storage Racks | |
| Sheet | 5357-H34 |
| Extrusions | 6063-T5 |
| Wire | 5056-H34 |
| Butter Keeper | 1100 |

When the above items are drawn, the "O" temper is usually selected if the draw is severe; otherwise, an intermediate temper such as -H12 or -H32 is chosen for its higher strength.

| Commercial Items | Alloy |
|---|---|
| Blower Coil | |
| Fins | 1100-0, H14, H16, depending upon collar |
| Coil Housing | 3003-H12, and H14, 5050-H32 |
| Blower Fan | 5050-H32 |
| Drip Pan | 3003-H12 and H14, Alclad 3003-H12 |
| Liners or Exterior | 3003-H14, 5005-H34, 5052-H34 |
| Meat Display Trays | 3003-H14, 3004-H34 |
| Price Tag Strips | |
| Formed sheet | 5357-H36, 5050-H36 |
| Extrusions | 6063-T5 |
| Window Frames | |
| Extrusions | 6063-T6 |


NATIONAL LOCK
introduces
the exclusive new
SAFETY LATCH

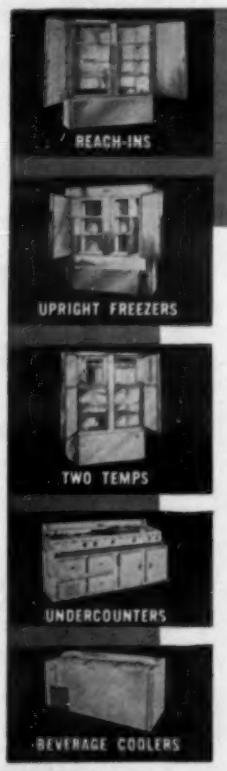
for refrigerators

- SAFETY-LATCH IS RELEASED BY PUSH ON INSIDE OF DOOR... OR PULL ON OUTSIDE OF DOOR
- USED WITH INOPERATIVE DOOR HANDLE AND ROLLER-TYPE STRIKE
- NO HANDLE ACTUATING DEVICE NECESSARY
- CLOSING DOOR RELOADS LATCH REGARDLESS OF POSITION OF BOLT
- ASSURES POSITIVE LATCHING ACTION FOR REFRIGERATOR DOORS
- MOUNTED VERTICALLY OR HORIZONTALLY ON RIGHT OR LEFT HAND DOORS
- NO LINKAGE PROBLEM... PROVIDES NEW FREEDOM IN HANDLE STYLING
- SMALL, COMPACT, LOW IN PRICE TOOLED AND READY FOR SHIPMENT

Write for sample and technical data on the outstanding new SAFETY-LATCH Series 59-844. National Lock engineers will work with you in creating all types of quality appliance hardware.

NATIONAL LOCK COMPANY
ROCKFORD, ILLINOIS
REFRIGERATOR HARDWARE DIVISION






FOSTER
ORIGINATOR AND OLDEST CONTINUOUS MANUFACTURER OF Welded All Aluminum REFRIGERATORS AND FREEZERS
Designed and engineered for heavy duty performance

FOSTER BUILDS OVER 200 MODELS OF MATCHED PRODUCTS
ONLY ONE TOP QUALITY LINE! NO 2ND OR 3RD LINES!

Whether it's for a hotel, restaurant, school, hospital, or any institutional user — there's a model designed specifically to fit individual needs.

Foster has had long and successful experience in building welded all-aluminum refrigerators and freezers for installations all over the world. They have met every in-the-field test for strength, durability and long life.

Thousands upon thousands of satisfied users know that Foster meets the most exacting specifications, the most critical demands of hard, day to day use, year after year.

And most important—they're priced low and right!

EXCLUSIVE SALES FEATURES CLOSE ORDERS
SELECTIVE DISTRIBUTION INSURES PROFITS!

NATIONWIDE FACTORY TRAINED REGIONAL SALES MANAGERS FOR SALES AND SERVICE
FOSTER REFRIGERATOR CORP.
HUDSON, N. Y.

For information write to Box 32 at the above address.



REFRIGERATION RESEARCH

ENDEAVORS TO REDUCE COST TO CUSTOMERS THROUGH IMPROVED AND SIMPLIFIED DESIGN.

— *Examples* —

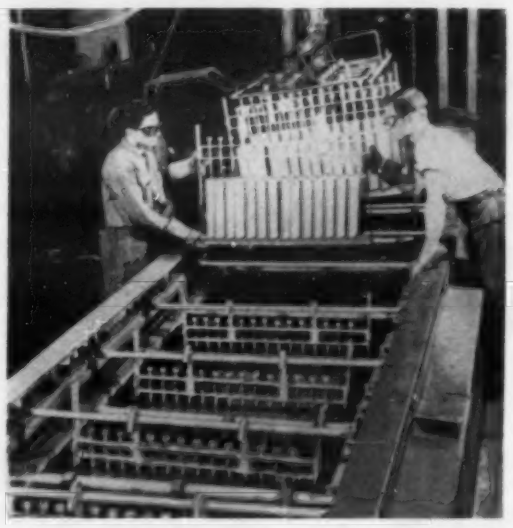
- ADVANCED STRAINER CONSTRUCTION.
- WIRE CLOTH SILICA GEL BAG FOR ACCUMULATOR-DRIERS.
- FLEXIBILITY OF RECEIVER DESIGN.

Refrigeration Research Pledge to the Industry—To Continue to Improve Quality and Reduce Costs Through Engineering and Manufacturing Advances.

REFRIGERATION RESEARCH
BRIGHTON, MICHIGAN




*For more information about products advertised on this page use Information Center, page 34.*



RECEIVING the anodized coating is this rack of ice cube trays being lowered into a tank.

# *Aluminum In Refrigeration--*

*(Concluded from preceding page)*

trous or colored items, involves only a 10-minute anodic treatment. Other aluminum components, ice cube trays for example, are given a slightly longer treatment.

In addition, the coating is impregnated with a special wax to give the trays their water repellent properties. This feature, available only on aluminum, prevents ice from clinging to tray and grid parts.

### *Evaporator Given Longer Anodic Treatment*

A refrigerator evaporator, since its exterior surfaces are often inaccessible for cleaning, is given a longer treatment to provide the added protection of greater film thickness.

In addition to the finishes mentioned, the appearance of aluminum sheet can be varied by mill rolls from a finish approaching belt-ground sheet through a wide range of embossed patterns. The choice, in a handsome pattern sheet, is usually a non-uniform design, such as stucco or leather grains. Matching or alignment of adjacent panels is then unnecessary. The belt-ground appearance is popular for commercial refrigerator liners.

Highly durable, attractive paint finishes are also available for aluminum. Engineers in the domestic refrigerator industry are keeping score on the one million or more painted steel refrigerator liners in use. One make has accumulated 18 years of service, convincing proof that a good paint system is perfectly capable of doing the job. The new abrasion-resistant organic coatings hold considerable promise as an alternate finish for aluminum shelving.

### *Aluminum Easy To Handle During Fabrication, Lowers Shipping Weight*

Aluminum's well-known qualities of light weight and strength have been put to good use by the refrigeration industry. Aluminum components are easy to handle during fabrication, and they lower the weight of large commercial cabinets sufficiently to reduce shipping costs and installation charges. And the advantage of reduced weight is achieved without loss of strength.

Aluminum sheet is recognized today as an effective barrier against heat radiating from artificial sources. This characteristic of aluminum results from the metal's ability to reflect heat waves. At the same time, the surface of aluminum is a poor emitter of heat. These attributes work together to reduce the amount of heat that can pass from a hot kitchen through a refrigerator's aluminum exterior to the cold inner liner. This results in less compressor running time and lower operating costs.

LIGHT, STRONG, corrosion-resistant aluminum makes excellent refrigerator shelving.

### *Used for Coil Housing, Plate Fins, Blower Fan, Drip Pan*

In commercial units, where the evaporator is frequently a blower coil, aluminum is commonly used for the coil housing, plate fins, blower fan, and drip pan. Some suppliers in the commercial field offer aluminum shelves as well as aluminum trays for meat display cases.

Only in the case of domestic refrigerator liners has aluminum's application been limited. And manufacturing economics rather than performance has been the limiting factor. In their search for economy, major refrigerator manufacturers annually review available materials. Invariably, figures on liner costs demonstrate that a well run, captive enameling shop can produce a vitreous enameled steel liner that will cost less than an aluminum liner.

Firms lacking in-plant enameling facilities, however, or located some distance from jobbing enamelers, frequently find costs for an aluminum liner to be competitive. When handling costs and replacement charges for enameled panels damaged in installation are considered, the aluminum liner may be best.

There is considerable misinformation in circulation on the subject of cleaning aluminum. The leading cleaner manufacturers are aware that their products must be designed for use on all materials commonly found in the kitchen. They formulate their cleaners accordingly. Manufacturers of aluminum refrigeration equipment list and recommend these.

### *Clean Aluminum with Ordinary Kitchen Materials*

In the absence of instructions, aluminum components can be cleaned with materials normally used on everyday utensils found in the kitchen.

A review of the alloys and tempers generally used for the aluminum applications mentioned are included in the following chart. There is a wide choice, and the selection should be based on the relative importance of formability, appearance, strength, and stiffness.

"See-thru" fronts of
*Thermopane*®
stimulate impulse buying

Frozen foods, meats and dairy products are often bought on impulse. So, they should be displayed as prominently as canned goods.

Refrigerated cases with "see-thru" fronts of *Thermopane* insulating glass give full vision. Customers quickly spot items they might otherwise overlook. Clerks can instantly see when stock needs replenishing.

Only *Thermopane* has the famous *Bondermetic Seal*® which prevents condensation between the panes and keeps out dirt. This seal contains no organic material to deteriorate.

The next time you buy refrigerated cases, look for "*Thermopane*" imprinted on the seal between the panes. *Thermopane* is used by all leading refrigerated case manufacturers. For their names, write Libbey·Owens·Ford Glass Co., 608 Madison Ave., Toledo 3, Ohio.


Two or more panes of glass
Blanket of Dry Air provides insulation
Bondermetic (metal-to-glass) Seal* keeps air dry and clean
*®

LOF GLASS

*Thermopane*
INSULATING GLASS
LIBBEY·OWENS·FORD
*a Great Name in Glass*

**Component Control System**

# *How Sutton Controls Moisture Content Of Its Room Air Conditioners*

*By R. G. Cordes, R. E. Layton, and Q. V. Moser, The O. A. Sutton Corp., Inc.*

In the manufacture of room air conditioners, and for that matter, any refrigeration equipment, manufacturers are becoming more and more conscious of moisture and the long-range effects of moisture on systems. This article delves into the methods used by The O. A. Sutton Corp., Inc., in the control of moisture in monochlorodifluoromethane (refrigerant "22").

The standard used by many in the industry is 25 parts per million (p.p.m.) of moisture in refrigerant. Recent articles and discussions have leaned toward lower specifications in the order of 10 or 15 p.p.m.; some manufacturers have claimed moisture contents of 5 p.p.m. or less.

The allowable moisture content should probably vary with the type of refrigerant used, the kind of refrigeration product, and the application of the product.

To control moisture in the final product, two approaches can be used:

1. Assemble the refrigeration system and perform dehydration processes on the completed assembly, or

2. Control the moisture in each component before assembly.

This article explains a system of component control.

Let us review each of the components of a refrigeration system and determine the controls necessary to assure a dry end product. Controls are necessary on:

(1) Condenser and evaporator. (2) Connecting tubing. (3) Compressor. (4) Oil. (5) Refrigerant.

In our method of processing, there are two other control points:

(6) Factory dry air supply. (7) Leak test refrigerant supply.

## PROCESSING

**Condenser and Evaporator Tubes** are expanded hydraulically before return bends are added. Immediately following the expansion process, the coils are baked for 7 minutes at 250° F. with the open ends of the "U" tubes free draining. Immediately upon removal from the bake oven, the coils are placed on a dry air manifold and 300° F. dry air, -40° F. dewpoint or less, is allowed to pass through the individual tubes for 10 seconds.

Return bends are assembled, brazed, and charged with dry air at 300 p.s.i.g. for submersion leak test. After test, the coils are cleaned, baked at 250° F. for 5 minutes, blown out for 15 seconds with dry air at 300° F., cooled by purging with cool dry air, and capped for storage.

The process described is capable of consistently producing coils with a moisture content of less than 15 milligrams. Coils are taken to the Quality Control Laboratory daily for residual moisture test.

Fig. 1 is a sketch of the residual moisture test apparatus. The following procedure is used in the test:

a. The test system is evacuated to the pinched-off hoses that couple the vacuum system to the coils, while the oven heats to a temperature of 250° to 270° F.

b. The hoses are coupled to the coils, the cold traps are immersed in liquid nitrogen, and the hose clamps are removed. The dehydration cycle has commenced.

c. The coils are dehydrated for a period of one hour. Pressure within the system ranges from 100 to 200 microns, depending on the materials available for vaporization, during the dehydration cycle.

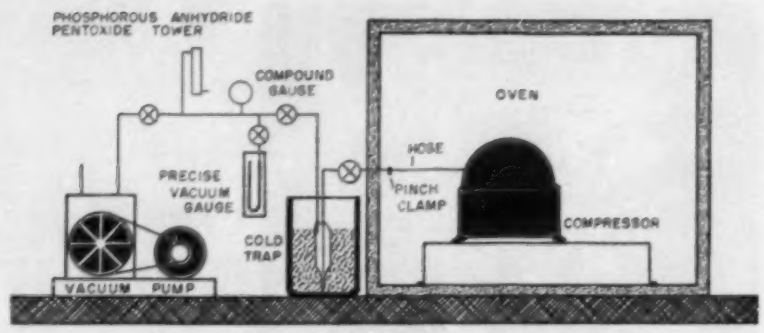



FIG. 1—Sketch of residual moisture test apparatus.

d. The vacuum pump is valved off from the system, and the vacuum in the cold traps and coils is relieved through the phosphorus pentoxide tower to atmospheric pressure.

e. The cold traps are removed from the system, capped, warmed sufficiently to liquify the trapped moisture, and centrifuged. The tips of the cold traps are calibrated such that milligrams of water are read directly.

f. The total moisture content must not exceed 15 milligrams.

If at any time the test results show more than 15 milligrams, immediate checks are made on the line processing methods; and additional coils are taken for test. A standard of 15 milligrams has been set for all sizes of coils to simplify the standard. The process is capable of properly dehydrating the largest coils.

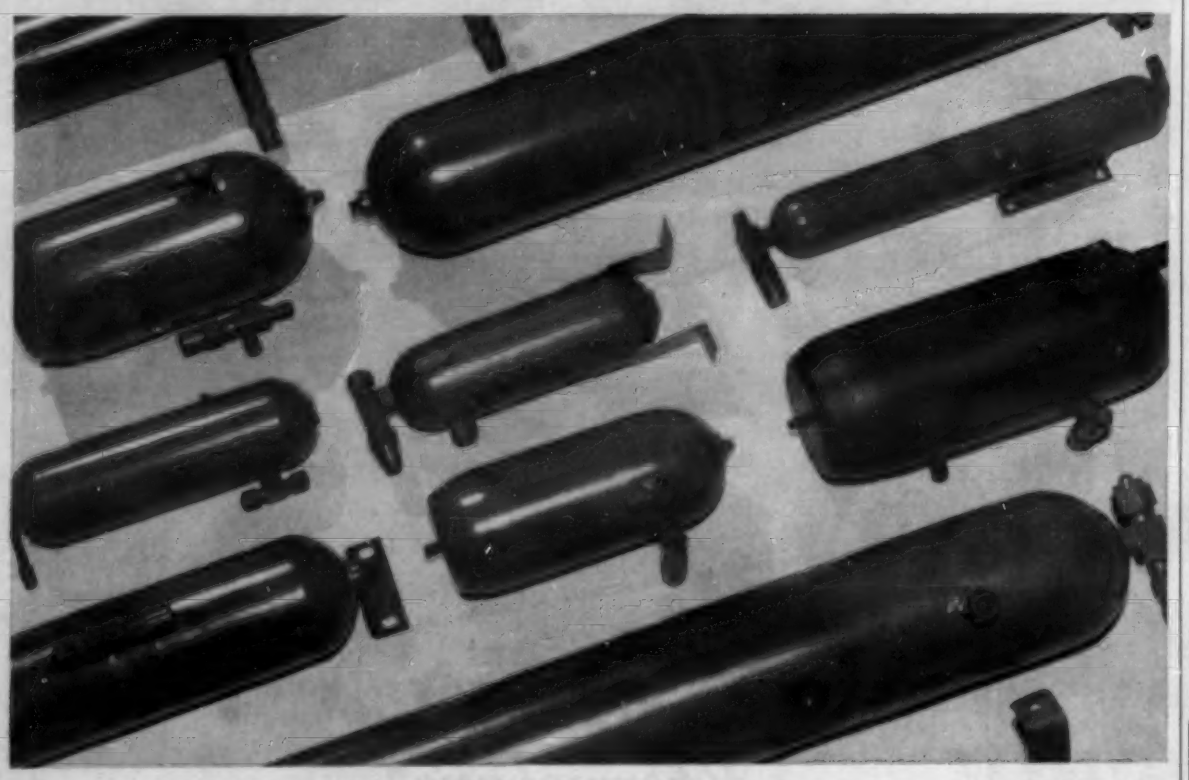
**Connecting Tubing** is purchased dry from vendors. After forming, suction tube assemblies are baked at a temperature of 250° F. for 10 minutes and are then blown out for 10 seconds with dry air, -40° F. dewpoint or less, or dry nitrogen. They are then plugged or capped.

After the forming operation and just prior to the assembly on the air conditioner, all connecting tubing is again blown out with dry air for a minimum of three seconds.

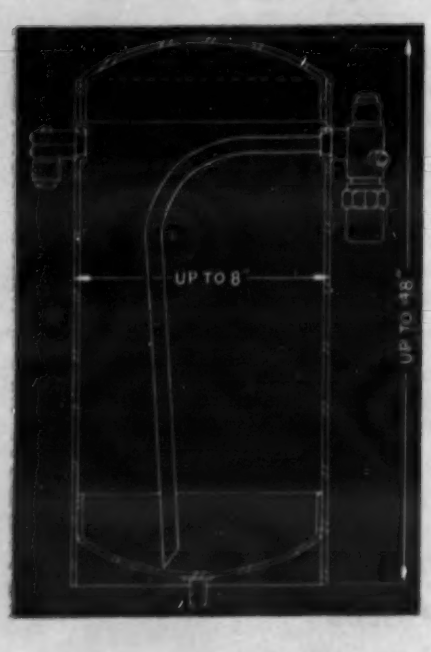
At regular intervals, pieces of connecting tubing are taken to the Quality Control Laboratory for moisture analysis. The method of test is similar to that

*(Continued on next page)*


# TUBE MANIFOLD LIQUID RECEIVERS



## Made to Specifications... Produced in Volume




Design and production engineers throughout the industry have learned that they get full cooperation by working hand in hand with Tube Manifold. Flexible manufacturing procedure makes it possible for them to secure liquid receivers made to their own exacting specifications as to size, capacity, fittings, brackets and pressure requirements. Tube Manifold facilities are geared for flexibility on a high production basis.

**For Refrigerators and Household, Commercial and Automotive Air Conditioners**

Manufacturers of all types and sizes of refrigeration and air conditioning equipment depend on Tube Manifold.

Self-contained receiver-driers developed by Tube Manifold especially for automotive air conditioners provide savings in space, fittings, brackets and assembly time.

Tube Manifold Liquid Receivers are made in sizes up to 8" diameter and 48" long. Send your specifications for prompt engineering and price information.

*Fabricators of Tubular Products Since 1920*

**TUBE MANIFOLD**
CORPORATION
435 BRYANT STREET N. TONAWANDA, N. Y.



*ANNOUNCING THE NEW*

**MIDWEST CONDENSATE DRIP PUMP**

- Rugged construction built for continuous duty
- Can be connected to compressor or fan
- 110 or 220 volt
- Neoprene seal prevents water from reaching motor
- 48" lead wire included
- Will pick up water down to ½" depth
- Heads to 20 feet
- Tube or pipe thread outlet
- 6" overall height
- Guaranteed

*Consult factory for any special features*

Thousands of MIDWEST Condensate Pumps are used by leading manufacturers each year. These new space saving, high quality, low priced Condensate Drip Pumps join the MIDWEST line of job-rated pumps.

**TECH-TRON CORPORATION**
LAWRENCE, KANSAS




*For more information about products advertised on this page use Information Center, page 34.*

FIG. 2 pictures the "Freon" evacuation system used by Sutton.

FIG. 3 shows refrigerant being passed through $P_2O_5$ train to determine moisture content.

# *Moisture Content Control--*

*(Continued from preceding page)*

described for evaporators and condensers. Since the amount of moisture in one piece of tubing is usually very small, a number of tubes are coupled together with short lengths of hose. Moisture content in tubing must not exceed 5 milligrams for any one air conditioner.

**Compressors** are received dry from the vendor. Incoming lots are carefully sampled for moisture content by residual moisture tests. Pre-assembly precautions consist of checking the compressors before removal of the rubber port plugs, to determine that they are charged with dry air.

### *7 Points of Quality Control Test*

The Quality Control Laboratory test for residual moisture in compressors includes the following: (see Fig. 2)

a. Compressors are received with a dry air charge.

b. The system is evacuated to the pinched-off hoses, which couple the system to the coils, while the oven heats to a temperature of 250° to 270° F.

c. The hoses are coupled to the compressor coupling manifold, the cold traps are immersed in liquid nitrogen, and the hose clamps are removed. The dehydration cycle has commenced.

d. The compressors are dehydrated for a period of 4 hours. Pressure in the system is reduced to below 200 microns during the dehydration cycle.

e. The vacuum pump is valved off from the system, and the vacuum in the cold traps and compressors is relieved through the phosphorus pentoxide tower to atmospheric pressure.

f. The cold traps are removed from the system, capped, warmed sufficiently to liquify the trapped fluids, and centrifuged. The tips of the cold traps are calibrated such that milligrams of water are read directly.

g. A relatively small quantity of a compressor's oil charge may be vaporized during the dehydration cycle. This oil, of course, is recondensed in the cold trap; but due to the mixability characteristics of oil and water, accurate moisture determinations are not impaired. A specification of 100 milligrams or less of water has been established for this method of test.

It is true that heat applied directly to the windings of a compressor would aid in driving off more moisture and perhaps result in higher test readings of moisture content; however, the purpose of this test is to compare one compressor with another and not necessarily to determine the absolute moisture content in any one compressor.

It is known that all of the moisture in the windings of the compressor is not available to the refrigerant as it circulates through the system; therefore, it is not imperative that the windings be completely dry.

The compressors are oil charged by the vendor. Therefore, the test result represents moisture from both the compressor and its oil charge.

Refrigerant as received in 1-ton drums contains a maximum of 10 p.p.m. of moisture. Handling of the refrigerant through pumps and charging boards could add moisture. Daily checks are made on the charging boards to control moisture content to less than 15 p.p.m.

Each 1-ton refrigerant drum is sampled prior to usage and checked for moisture content by the $P_2O_5$ method. The method will not be described here in that it closely parallels the method outlined in technical paper No. 822 issued by Kinetic Chemicals, Div. of E. I. du Pont de Nemours & Co.

### *Lists Ways Moisture Can Be Added Before Charging*

The charging boards used on our production lines were built by Production Control Units, Inc. There are a number of ways that moisture can be added to the refrigerant from the time that it leaves the 1-ton drum until it is charged into the room air conditioner.

1. Moisture can enter through a leak in connecting tubing.
2. Moisture can be present in the diaphragm used to meter the refrigerant.
3. Moisture can be present on the discharge port of the charging gun because of condensate caused by the quick expansion of the refrigerant gas.

As a result, charging boards are checked twice each day for moisture content; a control of 15 p.p.m. has been set. The entire charging system is checked for leaks at least once each week. Charging guns are kept at a temperature of 100° F. so that the charging connections never reach the temperature of the dewpoint of factory air.

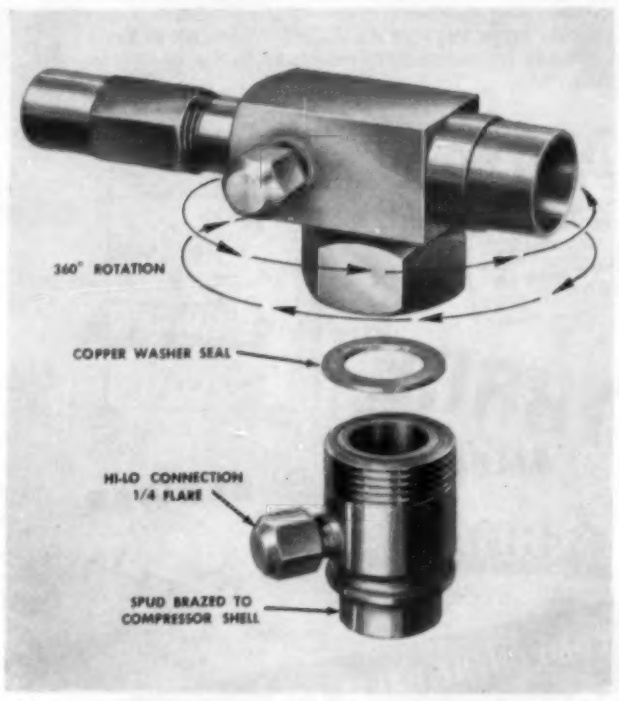
**Factory Dry Air Supply** is

*(Continued on next page)*

## PRIMORE ANNOUNCES 2 NEW VALVES

*designed to meet your needs-*

To meet the ever changing conditions in the air conditioning industry, Primore engineers have designed two new rotating type valves. The Compressor Break-Away Spud Valve for remote air-cooled residential systems, and the new Swivel Pad Valves for automotive air conditioning units. Both types feature complete flexibility, they allow the valves to be placed in a more direct line with tubing for easier connection or servicing of unit.




The new mechanical connector on the Primore Compressor Break-Away Spud Valve permits the valve to be rotated a full 360 degrees for easier connection.

**THE NEW ROTATING BREAK-AWAY SPUD VALVE,** engineered for remote air cooled systems, assures fast, positive connection of tubing from compressor to evaporator and condenser. When servicing a unit thus connected, it requires *No Field Pre-Assembly — No Field Cleaning — No Field Soldering!* NO FIELD CHARGING! Condensing Unit, Evaporator and Refrigerant Tubing are all pre-charged, ready for hook up. Will not lose charge.

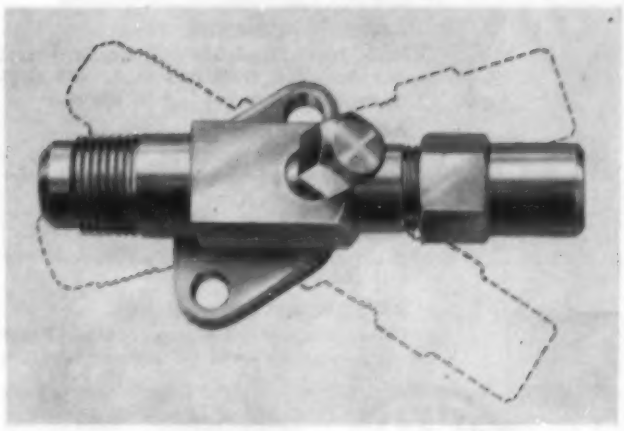
The spud mounted hermetic compressor valves, for both suction and discharge together with Primore shut-off valves, give the design engineer full control of the entire system. Available in practically all standard sizes.

The new rotating Primore Compressor Break-Away Spud Valve is also available with mounting bracket as illustrated.

Write for details and Primore catalog, giving pertinent data on air conditioning and refrigeration valves.

### NEW SWIVEL PAD VALVES for Automotive Use

For automotive air conditioning systems Primore engineers have developed this new swivel type Compressor Pad Valve. It gives the designer the utmost freedom in placing the valve in a more advantageous position with tube connection. Available in all the most commonly used sizes, equipped with standard size flanges.



Swivel feature of pad valve allows valve to be turned either to left or right depending on your needs.

**Primore Sales, inc.**

310 National Bank Bldg., Adrian, Michigan

REFRIGERATION • SALES • DESIGNING • ENGINEERING

# How Component Moisture Control System Works In Sutton Plant

*(Continued from preceding page)*

used at many points throughout our assembly operations. In addition to the purge stations mentioned in the discussion of condensers and evaporators, the dry air supply is used to blow out each condenser and evaporator just prior to assembly on the air conditioner.

The dry air supply is checked once each hour by process inspection and is maintained at a dewpoint of -40° F. or dryer. The drying system used in our plant is capable of consistently maintaining the supply of dry air at a dewpoint of -100° F. All dry air drops throughout the plant are checked daily for conformance to the specification. An Alnor Dew Pointer is used for dry air checks.

**A Leak Test Refrigerant Supply** is used in the preliminary leak test. The primary purpose of this test is to check the air conditioner for leaks prior to evacuation and final charging. Dry refrigerant used at this station could materially aid in the removal of moisture from the system. Samples are taken from this station at least once each day and checked in the Quality Control Laboratory by the $P_2O_5$ method of analysis. The leak test refrigerant is maintained at below 15 p.p.m.

### FINAL ASSEMBLY CHECK

We have shown by past experience that if all of the components are held within the specification, the final product will be within the specification. To keep a constant check on the effectiveness of the component control system, completed air conditioners are checked daily by the Quality Control Laboratory.

FIG. 4 — Special system, designed specifically for the research project, aided in determining characteristics of moisture in refrigeration system.

Fig. 2 is a photograph of the "Freon" evacuation system. The moisture test consists of the following:

1. The air conditioner is run for one hour prior to test.
2. A "Tap a Line" fitting is used to tap into the system.
3. The entire refrigerant charge is evacuated into a cold trap.
4. The vacuum pump exhaust is collected in a graduate to determine the non-condensables in the system.
5. The evacuation continues until the pressure in the air conditioner is reduced to 1,000 microns or below.
6. The weight of the refrigerant is determined.
7. The refrigerant is passed through a $P_2O_5$ train to determine the moisture content. (See Fig. 3.)

### CORRELATION

Research has been conducted in our Quality Control Laboratory to determine the moisture available to the circulating refrigerant with the absolute moisture content of the system known.

For a pound of monochlorodifluoromethane, it has been computed that 1 milligram of water will increase the refrigerant moisture content by approximately 2 p.p.m. A pound of absolutely dry Refrigerant 22, therefore, needs 12½ milligrams of moisture to reach the limit of 25 p.p.m.

If each of the components used in the air conditioner has the maximum allowable moisture content, then the total moisture of the system is:

| | Maximum Milligrams |
|---|---|
| Condenser and evaporator | 30 |
| Connecting tubing | 5 |
| Compressor with oil | 100 |
| Refrigerant | 7 |
| | 142 mg. |

It can be readily computed that if all of the 142 milligrams were available to the 1 lb. of 22, the moisture content would be 284 p.p.m.* (*Actually this figure is 313 p.p.m., but for purposes of simplification in this article the 2 to 1 ratio is used.)

We know, however, that the moisture will distribute itself throughout the system so that the partial pressure of water vapor in each component will be equal when equilibrium is reached.

The cellulose in the compressor windings takes a good share of the water vapor, the copper tubing takes some, the oil takes some. The tests described in the addendum of this article show that the ratio of moisture that will be absorbed by the refrigerant to the total moisture content is approximately 8%.

This means that if the total moisture is 142 milligrams, 11.3 milligrams would be absorbed by the monochlorodifluoromethane which would result in a moisture content of 22.6 p.p.m. We know from past experience that all of the components will not be at their maximum specifications at the same time; therefore, the additional safety factor keeps our final product well below 25 p.p.m.

### CONCLUSIONS

1. Component moisture control is an effective way of controlling moisture in the final product.
2. Compressors are the greatest contributor to moisture in the finished product provided adequate controls are maintained on other components.
3. Approximately 8% of the total residual moisture of a system will be available to the refrigerant.
4. A common moisture specification and method of test is needed for the industry.

### ADDENDUM TO CONTROLLED MOISTURE

To determine the characteristics of moisture in a refrigerant system, it was necessary to conduct laboratory research tests. A special system designed specifically for the research project and shown in Fig. 4 was used in the following manner:

1. All tubing and coils were evacuated in an oven at 300° F. for three hours in order to re-

*(Concluded on next page)*


Acme

THE LEADING CHOICE OF THE LEADERS

THESE ORIGINAL EQUIPMENT MANUFACTURERS

For over thirty years ACME has been producing air conditioning and refrigeration products preferred by original equipment manufacturers of commercial and industrial refrigeration and air conditioning equipment.

ACME's background as heat transfer specialists means dependable, highly efficient products for original equipment manufacturers and general distribution. Products of the outstanding manufacturers whose trademark appears on this page depend on ACME to maintain their high standards by using components from the complete Acme line.

WORTHINGTON · Carrier · AMERICAN-Standard · WATERLESS Air-Cooled Marvair AIR CONDITIONER · PROVEN QUALITY 50th Anniversary BRUNNER SINCE 1906 "DEPENDABLE" · Coleman · Lehigh BLU-COLD · Westinghouse · TECUMSEH · TRANE · AMERICAN BLOWER · Airtemp DIVISION CHRYSLER CORP. · Copeland REFRIGERATION · UNARCO · SCHNACKE · Carrier · USAIRCO · bryant

SELECT COMPONENT PARTS FROM THIS COMPLETE Acme LINE

**DRY EX® WATER CHILLERS**
More than 700 combinations from which to choose, assuring you of the most efficient chiller operation obtainable. Capacities from 5 to 400 tons for all common liquid chilling applications.

**ACME CONDENSERS**
More than 125 models and standard sizes of Freon and Ammonia shell and tube, and shell and coil types. Capacities from ½ to 700 tons.

**ACME COOLING TOWERS**
Available for use where compactness counts. An all metal tower completely galvanized for long life. Capacities from 3 to 175 tons.

**ACME OIL SEPARATORS**
A complete line of Freon or Ammonia separators for 5 to 100 ton systems.

**ACME HEAT EXCHANGERS**
Compact, efficient Freon suction and liquid line heat exchangers designed for systems from 3 to 150 tons.

**ACME LIQUID RECEIVERS**
More than 70 standard sizes for Freon, Ammonia, or other refrigerants. Capacities from 3 to 150 tons.

**ACME EVAPORATIVE CONDENSERS**
For Freon or Ammonia. More than 30 models with capacities up to 1,872,000 BTU/hr. from which to choose. Your choice of either copper tubing or steel pipe coils. Completely hot-dipped galvanized after fabrication. Capacities from 4 to 130 tons.

**ACME PACKAGED LIQUID CHILLERS**
Factory assembled, pre-tested packaged liquid chillers shipped ready for instant installation. For residential, commercial, and institutional systems of 2 to 300 tons. Balanced performance from matched Acme components, these units are also used as Heat Pumps, providing both heating and cooling.

ACME AIR CONDITIONING REFRIGERATION

Acme INDUSTRIES INC. Jackson, Michigan

Dry-Ex Liquid Chillers · Liquid Receivers · Heat Exchangers · Condensers · Packaged Chillers · Packaged Heat Pumps · Evaporative Condensers & Cooling Towers · Room Conditioners

Manufacturers of Quality Air Conditioning and Refrigeration Equipment since 1919




*For more information about products advertised on this page use Information Center, page 34.*

***Table 1—Compressor Residual Moisture (Mgs.)***

| Hours of Evacuation | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|
| 1 | 100 | 140 | 190 | 215 | 230 | 235 | 240 |
| 2 | 80 | 110 | 140 | 170 | 175 | 180 | 185 |
| 3 | 60 | 95 | 130 | 195 | 200 | 210 | 220 |
| 4 | 110 | 170 | 210 | 260 | 270 | 275 | 280 |

The data above shows the accumulative moisture collected in the residual test of compressors after the six-hour run-in.

***Table 2***

| Test No. | Total Weight of "F-22" In Test Grams | Total Moisture In Monochlorodifluoromethane After Completion of Test Milligrams | Moisture Left In Compressor At Completion of Test Milligrams | Sum of Compressor Moisture and "Freon" Moisture After Test Milligrams | Per Cent of Moisture In "Freon" to Total |
|---|---|---|---|---|---|
| 1 | 636 | 21 | 240 | 261 | 8.0% |
| 2 | 256 | 19 | 185 | 204 | 9.3% |
| 3 | 390 | 15 | 220 | 235 | 6.4% |
| 4 | 453 | 26 | 280 | 306 | 8.5% |

The data above are the test results of four systems using varying charge weights. All results correlate to an average of 8% of moisture available to the monochlorodifluoromethane.

## Moisture Control--

*(Concluded from preceding page)*

move most of the residual moisture.

2. A compressor with unknown residual moisture was added to the system.

3. In the four tests conducted, charge weights varying from 256 grams to 636 grams of monochlorodifluoromethane, at a known moisture content of six parts per million, were added.

4. The system was sealed and allowed to run for six hours.

5. At the completion of the run-in time, the monochlorodifluoromethane was evacuated and collected in a cold trap. The evacuation process continued until no flow was indicated in the evacuation hoses.

6. The refrigerant was tested for moisture by the gravimetric method to determine "total moisture in refrigerant after completion of test."

7. The compressor was removed from the system, and a residual moisture test was conducted for a period of 16 hours. The moisture removed was measured at regular intervals with results as shown in Table 1.

8. The residual moisture collected after 16 hours of evacuation under heat was considered the residual moisture of the compressor.

9. The compressor residual moisture added to the moisture found in the refrigerant was considered the "total moisture of the system."

10. The ratio of the refrigerant moisture to the total moisture is the correlation factor we were interested in obtaining.

The data collected in all of the steps described above is shown in Table 2.

The data substantiates that approximately 8% of the total residual moisture of a system is available to the monochlorodifluoromethane under the test conditions as described.

The moisture content of the refrigerant was not measured at equilibrium conditions because of the method of test used. It is recognized that at shutdown there is a migration of moisture which results in a distribution somewhat different than under equilibrium operating conditions.

The gravimetric method of test used in our laboratory requires a relatively large sample of refrigerant to be withdrawn from the system in order to make a moisture determination. This, in itself, changes the equilibrium conditions within the system under test. The method, however, lends itself very well to the determination of moisture ratios as described in this article.

This method of determining moisture relies on complete evacuation of the refrigerant. It can be readily seen that when a large percentage of refrigerant is removed, the system will be under vacuum and there will be a migration of moisture from other components such as the compressor cellulose.

Thus, the refrigerant collected in the cold trap has added to it some quantity of moisture which otherwise would remain in equilibrium in components other than the refrigerant. This usually results in moisture determinations somewhat higher than would be found if the moisture determination were made during operation of the system.

The research tests showed that 8% of the total residual moisture of a system was available to the circulating refrigerant; and from that point, it was relatively easy to determine the maximum allowable residual moisture in each component in order that the moisture in the refrigerant be kept below the 25 parts per million that was specified.

## McIntire Expects 'Permasorb' To Up Filter-Dryer Results

LIVINGSTON, N. J.—Use of a newly developed drying agent "Permasorb" is expected to increase the drying capacity of its refrigerant filter driers three times, without increasing the size of the drier, declares The McIntire Co. here.

Constituted of a blend of drying agents, Permasorb is said to provide balanced drying at high, low, or minute concentrations of moisture over the entire range of liquid line temperatures.

McIntire officials state that the new drying agent is stable under all refrigeration conditions and has the ability to remove all acids. There is no chemical reaction which in any way affect the refrigeration system, it is stated, and it isn't necessary to install the driers in a cool place.

The McIntire model "DC" filter-driers with Permasorb are also equipped with the "Permaclean" felt filters introduced last year. The DC line is available in replaceable cartridge types and factory-sealed types, in sizes from ⅛ hp. to 100 tons.

### M-H Ups Gilmore to V.P.

MINNEAPOLIS—W. W. Gilmore has been elected a vice president of Minneapolis-Honeywell Regulator Co., the firm announced recently. He is president of the company's Micro Switch division in Freeport, Ill.


put dacor on your team for '57

DACOR: Trade name for Disposable Activated Charcoal Odor Remover

**DACOR** in your '57 forced air furnaces or air conditioners gives you a winning combination that's bound to outscore competition . . . heating and/or cooling PLUS full-time air purification!

**Dacor** completes the job of air conditioning, freshening and revitalizing.

**Dacor** removes all kinds of household odors, fast.

**Dacor** banishes smog, smoke, dust.

**Dacor** increases unit efficiency — the sales clincher for budget-minded homeowners.

**Dacor** is a quick-opener for sales, a real punch thru the profit line for OEM's and dealers who add this money-maker to the '57 team. Write today for full information on Dacor, the amazing activated charcoal filter.

**BARNEBEY-CHENEY CO.**

COLUMBUS 19, OHIO ST. JOHNS, QUEBEC

WRITE FOR FREE LITERATURE

Barnebey-Cheney Co.
Columbus 19, Ohio
Tell me more about DACOR!

My name .....
Company .....
Address .....
City ..... State .....
I am: ☐ dealer ☐ mfg. rep. ☐ contractor ☐ O.E.M.

# Production Welding Using Inert-Gas Shielded Arc Highlights Hermetic Unit Production

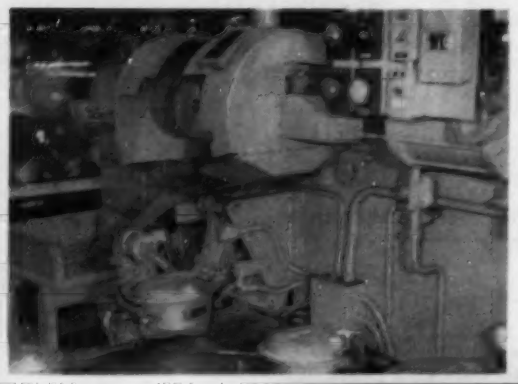
DETROIT — Kelvinator's Detroit plant has undergone many internal changes recently as the company "tooled up" and laid out new assembly lines for production of a new hermetic compressor.

The compact, "Space-Saver" compressor will be used on the company's 1957 household refrigerators and sold to other manufacturers by the contract sales department.

Among the manufacturing changes made possible by the design of the new compressors was the inauguration of production welding using an inert-gas shielded arc, instead of a carbon flux shield, to prevent oxidation.

This hermetic seal, essential for long and trouble-free life of compressors, must be performed in a way that prevents dust or dirt from entering the vacuum-cleaned interior.

MOVING ON a belt conveyor from the assembly line, Kelvinator's new, compact compressors arrive at the automatic welder which uses $CO_2$ gas as a shield against oxidation. Clamp holds cover of compressor shell until unit has been placed in welding machines.



LEFT: Compressors are set in place in the fork of each automatic welder. Fork clamps down on compressor to hold cover tightly to shell.

RIGHT: Fork picks up compressor and moves it from horizontal to vertical position. Then the machine moves the compressor into position for welding in front of the welding arc.

Butt-welding the cover plate to the shell by submerged arc tends to spread the flanges of the new compressors. The reverse lip flange of present compressor models did not pose this problem.

### *Inert-Gas Shielded Arc Process Offers Savings*

Experiments with inert-gas shielded arc process using carbon dioxide gas as the shield, indicated it would not only give an excellent seam weld, but would also offer important production savings. After fixturing and timing were solved, the equipment was installed in the production line.

Here, a serious problem developed that was not apparent in the trial setup because of the smaller number of units run through the testing. Spatter, inherent where $CO_2$ is a shielding gas, accumulated on the gas nozzle and in the molten form, dropped onto the weld joint ahead of the arc. Generally, a leak developed in the compressor at the point where spatter had dropped off the gas feed nozzle.

The accumulated spatter would also solidify on the gas feed, causing it to clog and to distribute the $CO_2$ shield improperly around the welding arc. Spattering can be reduced considerably by shortening the arc, but even with a shortened arc, Kelvinator discovered that fine spatter continued to build up on the gas feed which surrounds the welding wire.

PROTECTIVE HOOD slides over and compressor rotates 360° in front of welding arc. After welding compressor is ejected from rear of machine and slides down chute, it is hung on overhead conveyor.

The problem was eliminated by running a copper tube down the side of the welding head to the welding wire. Carbon dioxide was cut off from the regular gas nozzle and fed through the copper tube.

Position of the copper tube provides an effective gas shield, but, at the same time, partially removes the tube from the path of continuous spatter. The high heat conductivity of copper also tends to reduce adherence of the spatter.

Welding with a carbon dioxide shield is performed on an automatic welder that produces at a rate of approximately 100 per hour. Compressors arriving on a conveyor are placed by the operator in the fork of each automatic welder. The fork picks up the compressor and moves it into position in front of a stationary welding head.

A VIEW of part of the submerged arc welding machines in the Detroit plant. Man at left hangs compressors back on overhead conveyor after welding is completed.

After a protective cover slides over, the compressor shell and cover are welded together, rotating 360 degrees in front of the arc. After the compressor has been welded, it is ejected from the machine. At present, it slides down a chute where a second man hangs it on the conveyor. Plans call for installation of a belt conveyor to carry it to a man who will hang it on the overhead conveyor.

Using submerged arc welding machines, each operator turns out 55 household compressors per hour. Two handlers are required to take compressors from the conveyor and place them on a bench to the right of the welding machine where the operators can reach them.

After the cover is welded to the shell, handlers pick them up and hang them back on the conveyor.

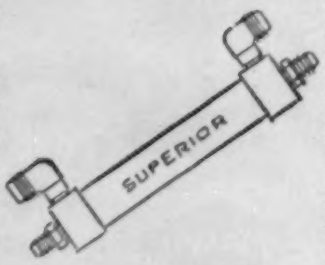
The new compact compressor weighs only 27 lbs. in the ⅛-hp. model, compared to 38 lbs. for the present model compressor. The ⅕-hp. compact model weighs 28 lbs. compared with 40 lbs. for the same capacity in the present model.

Pressed model household and commercial models are welded by submerged arc using carbon flux as shield. Compressors are placed in revolving fixture.

Both "Space Saver" models measure 6¼ in. at their thickest points, while the present model is 7¼ in. Outside diameter of the new compressor is 9¾ in., while the present model measures $10^{15}/_{16}$ in.


VSF

do you have a Heat Exchanger problem?




write to:

William C. Yocum
*Chief Engineer*
SUPERIOR
VALVE & FITTINGS CO.
1511 W. Liberty Ave.
Pittsburgh 26, Pa.

VSF
Superior
valve & fittings co.
pittsburgh 26, pa.

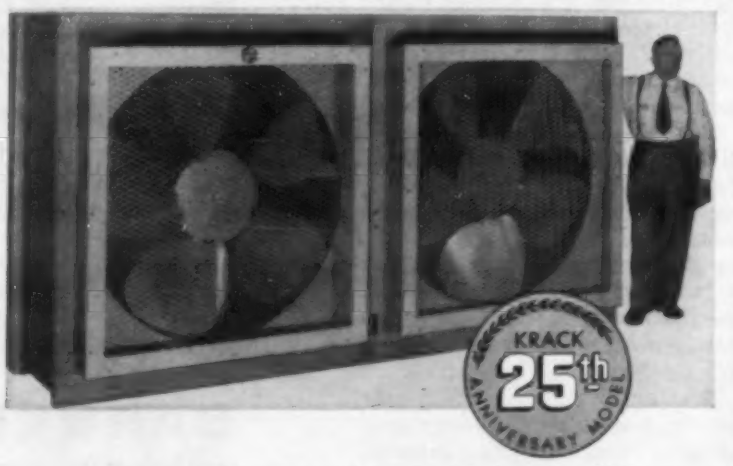


new KRACK air cooled condenser

Now available in capacities up to 30 tons.
No need to use an oversize condenser.

*Special Features*

1. Rust resistant
2. Semi-automatic belt adjustment
3. Counter-flow refrigerant circuiting
4. Minimum maintenance
5. Multi-circuiting at no extra cost




*Phone or Write for New Bulletin Today!*

KRACK REFRIGERATION APPLIANCES, INC.
901 West Lake St., Chicago 7, Ill.
MOnroe 6-1141

*Pioneers in Refrigeration and Air Conditioning Since 1931*




*For more information about products advertised on this page use Information Center, page 34.*

A MARCO MOTOR MILESTONE was observed as the 6,000,000th fractional horsepower motor specially designed for air moving equipment rolled off the assembly line at the Marco Industries, Inc. The motor was produced for a Fedders-Quigan air conditioner. Assistant chief engineer, Phillip C. Kennedy (l.), W. E. MacBeth, one of Marco's field application engineers (standing), and Marco executive vice president, G. Russell Edd (r.) witness the event.

# Marco Industries 10th Anniversary Marked by 6,000,000th Motor

WOMELSDORF, Pa.—Marco Industries, Inc., producer of small electric motors, celebrated its tenth anniversary by turning out its 6,000,000th motor.

Marco Industries, Inc., located in the Pennsylvania Dutch farm country, lays claim to being the first U. S. company to apply shaded-pole motors for industrial purposes. As a major supplier of motors for the air-moving equipment industry, including air conditioning, it also produces split capacitor motors ranging from 1/100 to ⅓ hp.

G. Russell Eddy, the company's executive vice president, declares that Marco is the only U. S. small motor manufacturer devoting its entire facilities to designing, developing, and producing fractional hp. motors for the air-moving industry.

Application of the Marco shaded-pole motor is virtually limitless, he said. Ninety to 100 differently designed motors have been shipped to customers by Marco in one month.

Marco Industries, Inc. now is readying its assembly lines for production of fractional horsepower motors to be used in 1957 air conditioners. At peak production, expected to start in the next 10 weeks, Marco will run three shifts, manned by a total of more than 750 workers.

Five field application engineers have just been appointed by Marco, says Eddy. These field application engineers are strategically located to give prompt service to manufacturers in metropolitan New York, upper New York state, and in the areas surrounding Chicago, Cleveland, St. Louis, Memphis, and Little Rock.

W. E. MacBeth, formerly with Howard Industries and Nash-Kelvinator, will concentrate his efforts in the greater New York area. Milton C. Matthews, formerly with the Delco Appliance Div. of General Motors, will operate in upper New York state from headquarters in Rochester.

Samuel Stein, of Spartan Engineering Co., will represent Marco Industries in the Chicago area and Milton Meyer, of Commercial Electric Co., will service customers in the Cleveland area.

R. W. Baumann and O. A. Baumann, Jr., associated for eight years with Baldor Electric Co., St. Louis, will represent Marco in the Little Rock, Memphis, St. Louis, and southern Illinois sections of the country.

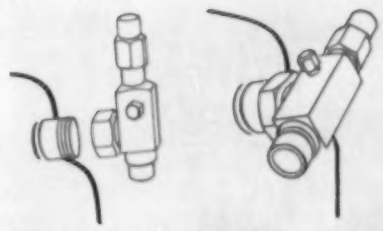
# Tecumseh Unit Built For Valve That Locks at Any Angle

TECUMSEH, Mich. — "Rotalock" a new type of detachable valve for use with refrigeration compressors, will be used by Tecumseh Products Co. with a line of air conditioning compressors from 1¾ hp. to 5 hp.

A main feature of the use of the Rotalock valve is that it will permit the positioning of suction or discharge connections at any angle through 360°.

This permits more flexible assembly of the complete air conditioning system.

Rotalock may be set at any angle to correspond with the direction of the tubing, eliminating short or compound bends. Once this angle is determined, Rotalock may be locked into position for maximum ease of installation in the system. This angle can be adjusted.



LEFT drawing show "Rotalock" detached. On the right the valve is locked into one of many possible angles.

Each compressor of the type that will use the Rotalock is equipped with universal spuds welded to the housing. This basic connection will take any normal size valve or tube. Valve or tube connections or adapters are ordered separately as component parts. Three types of connections for either the suction side are then possible.

In the design of the seating arrangement between the spud and the valve or tube adapter, the spud has a groove machined around the circumference of the face. A corresponding but smaller ridge is machined on the face of the valve or adapter.

Through the insertion of a soft copper washer between these faces, a tongue and groove seal is formed by the pressure of the nut. As pressure is applied, the washer is forced into the groove by the valve ridge.

ARROW points to "Rotalock" valve on 3-hp. Tecumseh hermetic compressor.


# WANTED

A man who wants to improve his earnings . . . a manufacturer's representative with an engineering background who knows and can talk to architects, engineers, and contractors in their own language about a product they need. Thousands of usAIRco self-contained central station air conditioners (RK) are already in use. RK's in capacities to 60 tons are cooling industrial plants, shopping centers, and retail stores across the country. You may be qualified to represent the leader in this field in your area, if it is open. Write today to Robert P. Kelley, sales manager, United States Air Conditioning Corporation, 7900 Tabor Road, Philadelphia 11, Pennsylvania, giving a brief resume of your background. An interview will be arranged.

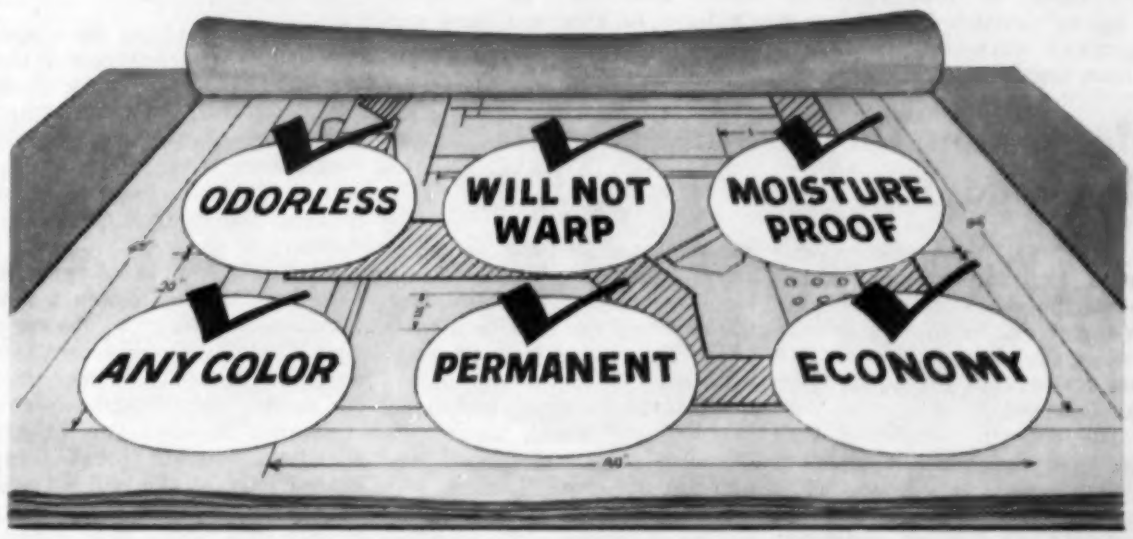


*Check these points!*

YOU'LL SEE WHY

**LOXIT MIRACLE BREAKER STRIPS**

ARE NATIONALLY RECOGNIZED FOR QUALITY AND PERFORMANCE!




● No matter what type of refrigeration unit you manufacture, there's a place for Loxit in your production plans. Loxit Miracle Breaker Strips are custom-made to meet your own specific needs—to conform to your own exacting requirements in the manufacture of commercial refrigerators, walk-in coolers, soft drink dispensers, display cases for frozen foods, ice cream, meat and dairy products, and other refrigerated units. Odorless, warp-proof and moisture-proof, they are completely fabricated—drilled, punched, countersunk or cut-out to conform to your blueprints. Prompt delivery in any color, size or design, and in thicknesses from one-eighth inch up.

Loxit solicits your inquiries and will be glad to submit quotations and samples of breaker strips made by Loxit to match yours, without obligation. Send us a sample set of the breaker strips you are using, or your blueprints.

**LOXIT SYSTEMS, INC.**

*Miracle Products Division*

MONTICELLO, ILLINOIS

BATTERY of sealed glass units are shown above being treated with dehydrated air. Producing these units for themselves has resulted in cleaner glass, lower costs, and greater flexibility, Bally Case & Cooler Co. reports.

## Making Own Sealed Glass Units Means Cleaner, Cheaper Glass

BALLY, Pa. — Producing its own sealed glass units means cleaner glass, lower costs, and greater flexibility to the Bally Case & Cooler Co. here.

George M. Prince, partner in the firm, admits that Bally could buy its multi-glass units. But this procedure, he believes, presents three disadvantages:

1. Long lead time needed for special sizes.

2. Extremely high prices on special sizes.

3. Inadequate quality for display case fronts.

"To eliminate these three objectionable conditions," Prince said, "our engineers developed and built machinery which enables us to manufacture our own sealed glass units in our own plant.

He described the process:

"These units, which consist of two, three, or four lights of glass, as demanded by the case in which they are used, are sealed together with spaces between glasses framed by an extruded aluminum channel which is sealed in place with a special sealing compound.

"When the unit has been completely assembled, it is put into a heated vault. Into each space between glasses is plunged a breather tube inlet and outlet.

"Specially treated and dried air is circulated between these spaces to dry up every bit of moisture which was pocketed in the air spaces between the glasses.

"When it has been mechanically ascertained that all moisture has been eliminated, the plungers are removed from the unit and the holes are sealed. Then the entire perimeter of the glass unit is covered with additional sealing material and a stainless steel protective binder edge."

He added that the room in which these units are made is air tight to keep out dust and dirt. It is also air conditioned to control humidity.

## Magnesium Die Castings Lighten Redmond Motors for Room Units

OWOSSO, Mich. — The Redmond Co. has recently introduced the use of magnesium die cast material in the stator core and end frames of its types AY and CY motors for window air conditioners.

The company explained that die cast construction adds to the motor's ruggedness, while the use of magnesium die cast material results in significant savings in weight and shipping costs, as well as economies in manufacturing.

The "Uni-Cast" construction feature in the AY "Micro-Motors" and the CY permanent split capacitor motors, provides a core frame that is precision die cast in one piece under extremely high pressure. This prevents the shifting of laminations during handling and motor use, the manufacturer said.

By machining both stator core registers simultaneously, the registers are held concentric to each other and to the bore at extremely close tolerances.

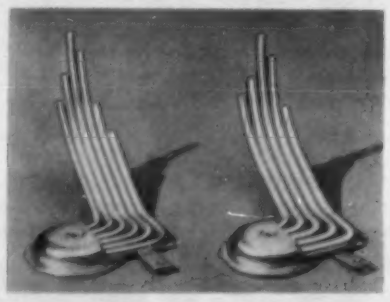
This manufacturing technique, the company noted, insures extremely close tolerances and uniform air gap. Coupled with the elimination of magnetic wedges, it provides a motor that is "whisper" quiet in operation.

Redmond said that it had recently added a new manufacturing facility in Angola, Ind. where the same magnesium die cast stator core construction, as well as "Tri-Flux" design and "Uni-Cast" construction, will be applied to a new line of type AL-4 and AM-4 motors for built-in and through-the-wall air conditioning applications.

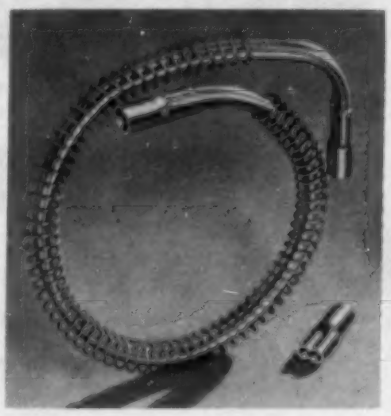
## 2 Firms Develop Discharge Tube, Compressor Muffler

TECUMSEH, Mich.—A "pipe organ" design of tubing carrying refrigerant gas on the suction side of a system into the compression chamber of a refrigeration compressor, has solved a noise problem for Tecumseh Products Co., it was announced.

Developed by Tecumseh engineers working in cooperation with Bundy Tubing Co. representatives, the compressor muffler consists of a series of four, five, and six tubes of varying lengths mounted on a special header which receives the suction gas coming back from the evaporator. The "pipe organ" design of the tubing was developed in laboratory research efforts to find means of reducing noise from the compressor.



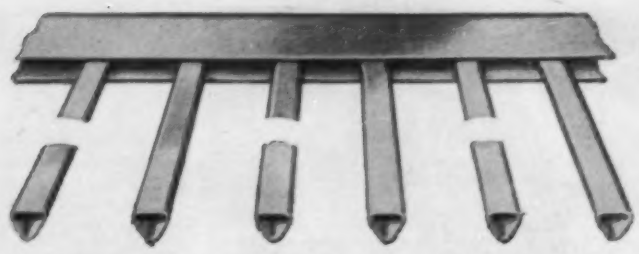
"PIPE ORGAN" design tubing solves noise problem for Tecumseh.



NEW compressor discharge tube designed for new compressor.

Also developed in cooperation with the Bundy Co. was a new compressor discharge tube for a new type of compressor. In this design a double tube was used for extra strength and superior resistance to vibration fatigue, the two separate tubes being brazed only at the end fittings. Steel coil-spring sheathing muffles the noise that results from the vibration of the discharge tube, it was pointed out.

The discharge tube is designed so that the O.D. of two tubes together is the same as the O.D. of the bifurcated Bundyweld end fittings, thus permitting the spring to be slipped on after the fittings have been brazed on to the double tube.



"TRI-TUBE" shelves are shipped to manufacturer as completely packaged assemblies.

## 'Tri-Tube' Shelves Offer Economy Better Appearance and Heat Transfer

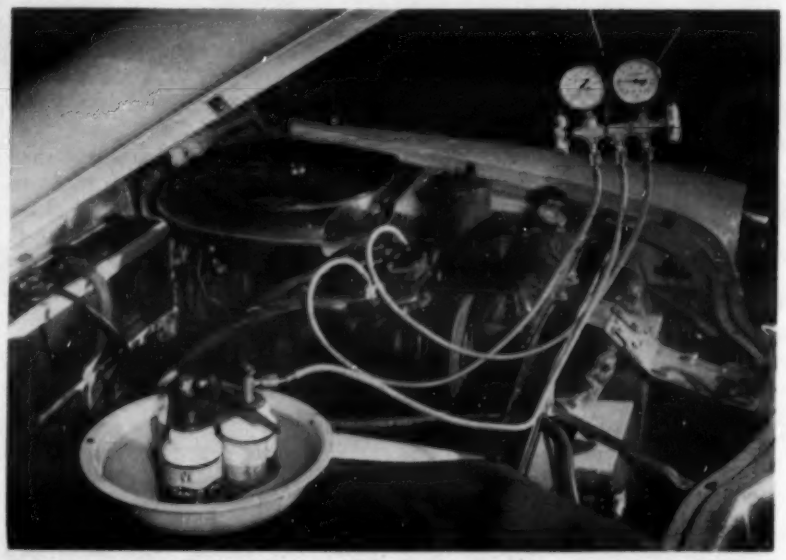
DETROIT—"Tri-tube" shelves for refrigerators and food freezers, said to combine low cost with attractive appearance and a more effective heat transfer job, have been developed by Bohn Aluminum & Brass Corp. and are now being made available to the industry.

Where shelves have usually gone to the manufacturer as individual units with copper connectors attached to both the inlet and outlet line of freezer, Bohn states that the new shelves are offered as completely packaged assemblies with shelves attached to each other.

One copper connector is placed at the inlet for the capillary tube connection and another is placed at the outlet for the suction line connection. Thus the manufacturer using these shelves need only join the copper capillary tube and the suction line to his unit.

The shelf is constructed by placing conventional round aluminum tubing in a special die which forms it into the triangular shape. This reforming process greatly hardens the tubing and increases tensile strength. Since the triangle itself is one of the most rigid of all construction forms, the flat surface formed by the top of the triangle provides a sturdy shelf area.

Another end use for this type of shelf is an ice cube tray shelf, and Bohn claims that ice cubes can be made faster because of the greater prime surface area. At the manufacturers' option, shelves can be delivered color anodized to blend with interior trim.



TYPICAL "Multi-Opener" on "Can-O-Gas" hookup for charging an automobile condensing unit.

## 'Multi-Opener' Simplifies Adding Pre-Weighed Refrigerant Charge

W. NORFOLK, Va.—To simplify the adding of a pre-weighed charge of refrigerant to a system in the field, the Virginia Smelting Co. has developed a "Multi-Opener" device to use with its "Cans-O-Gas."

The company notes that modern condensing units operate on a critical charge that must be measured to an accuracy as critical as plus or minus ¼ oz. for maximum operating efficiency.

The practical field solution to replacing a critical charge is to discharge the unit completely and add a pre-weighted charge of the prescribed accuracy.

Since the critical charge may vary from 8 to 48 oz. or more, how can the many pre-weighted charges be obtained without encouraging an impractical inventory problem?

Virginia Smelting's answer to this question is a series of Cans-O-Gas holding six different weights of "Freon-12" accurate to plus or minus ½ oz. The weights are 8, 8½, 10, 10½, 12, and 15 oz., respectively. Combining these weights by means of the Multi-Opener, 54 different critical charges can be assembled.

The Multi-Opener is made in three designs, to open two, three, or four cans simultaneously. This permits maximums of 30, 45, or 60-oz. charges or any combination in between.

The system can also be used to charge automobile air conditioning systems, Virginia Smelting notes. While the charge is not necessarily critical, this system eliminates heavy containers and bulky scales for weighing in the charge, the company said.

Moreover, since charging is done on the vapor phase, the immersion of the container in warm water (about 125° F.) to maintain positive vapor pressure, can be done with small portable equipment.

**HARDWARE WITH A HISTORY**
*Manufacturers of Quality Hardware for Over Sixty Years for Commercial Refrigeration*
COMPLETE LINE FOR
DISPLAY CASES WALK-IN COOLERS
REACH-IN CABINETS
REFRIGERATOR TRUCK BODY UNITS
MARINE HARDWARE
*We Welcome Your Inquiries*
**THE DENT HARDWARE COMPANY**
FULLERTON, PENNA.

**PARTS ORDERS for**
**UNIVERSAL**
• AIR CONDITIONERS
• REFRIGERATORS • FREEZERS and
• BEVERAGE COOLERS
including Alsco; Ambassador; Armaid; Artkraft; Cooleraire; Majestic; Philharmonic; Supremacy; U. S. Capitolaire.
Should now be sent to:
UNIVERSAL DIVISION
THE HORTON COMPANY
915 Liberty Ave., Pittsburgh 22, Pa.



*For more information about products advertised on this page use Information Center, page 34.*

# Refrigeration Problems
## And Their Solution
*By Paul Reed*
For Service and Installation Engineers

## Service Practices Improve Slowly (3)

There were some other points included in this talk given by a factory Service Manager back in 1937, that are not heard frequently enough today, yet they are perhaps just as prevalent now as 19 years ago. One of these concerns the adjustment of expansion valves.

### DON'T BE AFRAID TO ADJUST THE TEV

"The thermostatic expansion valve has two functions: one, to feed as much but no more refrigerant to the coil than the entire coil can evaporate, and two, to close tightly when the compressor starts and stay closed while the compressor is idle.

"In far too many remote installations, the valve is either not feeding enough refrigerant to make the coil fully active, or is overfeeding the coil, so that liquid refrigerant spills back to the compressor, where it usually causes slugging and damage to the compressor.

"Check other possible causes first—lack of charge, restriction and flash gas in the liquid line, improper location of the bulb, etc.—but if necessary, don't be afraid to readjust the expansion valve superheat setting."

This last statement was startling in those days, when the idea was prevalent that a TEV should never be readjusted from its factory setting.

### BALANCING THE HIGH-SIDE WITH THE LOW-SIDE

Another recommendation not often heard these days, concerns the balancing of the capacities of the compressor and the evaporator. The increased use of self-contained "packaged" systems has placed this burden on the factories, but it is still important on remote systems, where the condensing unit and the evaporator are selected and purchased separately.

### DO YOU CHECK OIL LEVEL?

Another point that is not heard about so much these days is the oil level in the compressors.

"Modern refrigerants are oil miscible; meaning that they mix readily with oil. Every man here knows that there is some oil mixed with the refrigerant in the receiver, liquid line, evaporator, and even the suction line.

"When the refrigerant was put into the installation it had no oil in it. Then, where did that oil come from? There is only one place it can come from—the compressor. If the lines are long and the evaporator large, and the refrigerant moves through the system slowly, it takes a great deal of oil to saturate the refrigerant.

"It may take practically all of the oil in the compressor crankcase to do this. Nor is there any accurate way to tell in advance how much oil will be required. So the only thing to do is to check the compressor oil level a time or two the first couple of days after a new installation is started up, and add oil to the compressor as required, to make up the shortage.

"Moreover, we can easily tell by inspection if a compressor returned to us for free replacement as noisy, was properly lubricated. So don't get mad at us if we charge you for the repairs to a compressor that has been abused by not keeping the oil level up to about the middle of the main bearings. It wasn't the compressor's fault nor ours; it was your fault."

### LOST TIME IS EXPENSIVE

As Service Engineers, we are all mechanical minded, but whether we carry a tool kit or sit at desks, we have to be money minded too, even more now than in 1937. On this important subject, the Service Manager had this to say:

"There is still another very important way in which costs can be cut in installation and service, and that is saving lost time. By lost time, I don't mean that the servicemen loaf on the job. As a trade, refrigeration servicemen are a hard working bunch. The work is frequently hard labor, the hours are long and the men are many times called out to work Saturdays, Sundays, holidays, and nights.

"By lost time I mean time that is wasted because of disorganized and untimed effort—time wasted because the serviceman must wait on the job for the truck to deliver the equipment and it is an hour late, time consumed in going to the supply house in the middle of a job 40 miles away, for a necessary fitting that should have been in stock and included with the installation material that was sent out with the job, time spent waiting on salesmen to get information as to what the understanding was with the customer regarding the location of the case or the removal of old equipment, which should have been shown on the order.

"All of these leaks of lost time and preventable service calls cost money, money that comes out of your profits, and, if they are unwatched, may entirely wipe out the profit on a job, and more besides. The old saying 'A penny saved is a penny earned' is just as true in the refrigeration business as in any other business.

"But don't forget another adage: 'Penny wise, pound foolish.' It is certainly poor business to spend $10 on service to save 50 cents on a gallon of oil or an expansion valve. So avoid either extreme; analyze your installation and service costs; find where, if any, there are some that are unnecessary and can be eliminated. When we think of the word 'disorganized,' we think of 'confusion.' Let's not have confusion—it's too expensive.

"You are selling a quality product. Good, suitable materials, modern design, precision manufacture, and fine workmanship have gone into the machine. But quality cannot stop there if the customer is to get a quality job. There must be quality installation and service, and the best part of quality is, that whether in the product or in the installation and service, it is the cheapest in the long run."

The passages that we have quoted from the talk given by this factory Service Manager almost 20 years ago, are just about as timely and as true as they were then.


NEW Designs and Features!
P-H REFRIGERATORS and FREEZERS

MODEL P 40-2
Self-Contained

Important features of the newly styled and completely redesigned P-H line of commercial refrigerators and freezers include:

- ☆ Genuine Porcelain or Stainless Steel Finish.
- ☆ Exclusive "Grad-U-Matic" Self-Defrosting Air Conditioning.
- ☆ Tubular Electric-Welded Steel Frames.
- ☆ Heavy Fiberglass Insulation.
- ☆ Solid or Triple Thermopane Doors.
- ☆ Self-Contained or Remote Control.

MODEL SA 15-15
Two-Temperature Refrigerator

APPROVED

MODEL P 66-3
Self-Contained

Also AVAILABLE — A complete line of Reach-In, Pass-Thru and Salad Refrigerators . . . Upright Storage Freezers . . . Baker's Freezers and Dough Retarders . . . Dairy-Delicatessen Cases . . . Two-Temperature Refrigerators . . . 22 to 96 Cu. Ft. Capacities . . . Dry Beverage Coolers . . . and Walk-In Coolers and Freezers.

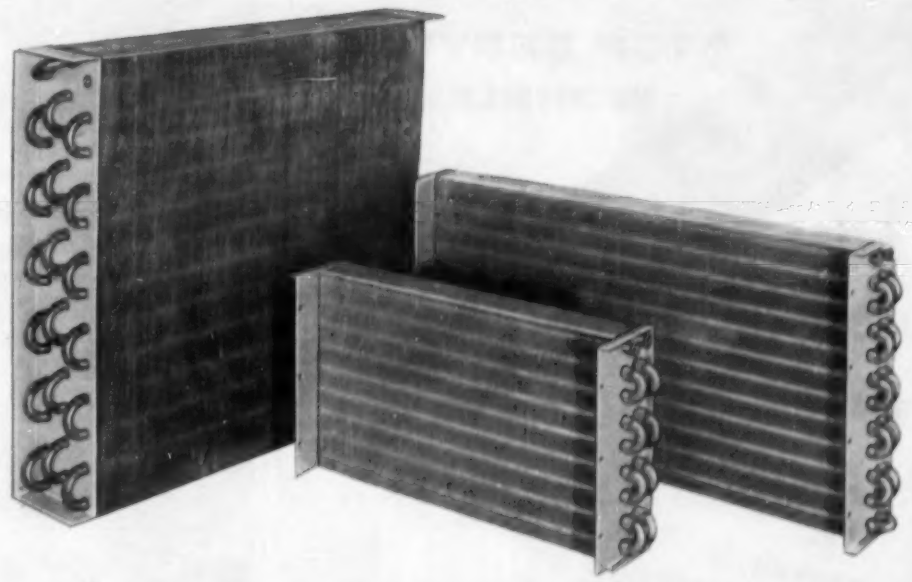
THE P-H LINE

Write FOR CATALOG!

PUFFER-HUBBARD REFRIGERATOR CO.
GRAND HAVEN, MICHIGAN
EXPORT OFFICE — PUFFER-HUBBARD INTERNATIONAL — 440 Lafayette St., New York City — Cable "MANREFSUP"



WHATEVER YOUR COIL Requirement



Perfex, a leader in the manufacture of heat transfer products since 1911, now offers you a complete new and modern line of refrigeration and air conditioning coils: condenser and evaporator coils for room and automotive air conditioning units, residential and self-contained air conditioning equipment, chilled water systems, and for portable refrigeration and air conditioning equipment; coils for hot water heating.

Perfex has an enviable record of over 40 years of manufacturing experience and research in heat transfer products—and this same experience and research goes into each Perfex coil. The salient features of Perfex coils are your positive assurance of long life and dependability in your Perfex equipped products.

Perfex offers a complete range of coil capacities from ⅛ HP to 10 tons to fit your individual requirements. Each coil is made accurately to your specifications and is engineered to give long, continuous service at maximum efficiency. By confining its operations to the manufacture of components only, Perfex is able to give you better service and close attention to your particular specifications.

Whatever your coil requirement—Perfex is ready to give you personal attention today! Write for complete details!

Perfex Corporation

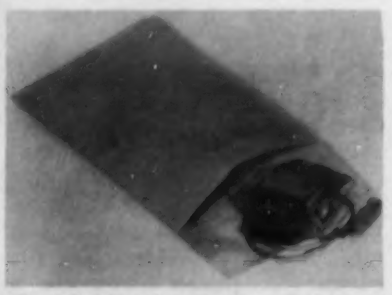
500 W. OKLAHOMA AVE., MILWAUKEE 7, WISCONSIN
COILS FOR REFRIGERATION AND AIR CONDITIONING

# How Cost Reduction Committee Puts Ideas Into Action

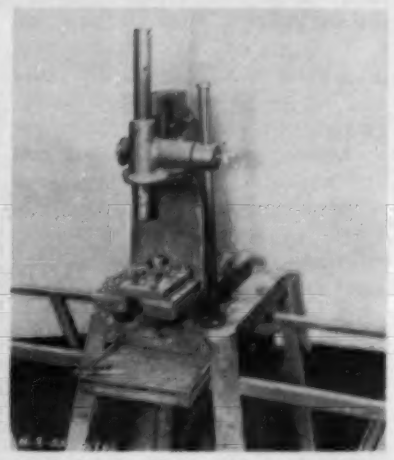
## Group Cuts Costs by 5% In 2 Years by Meeting Weekly, Following Through on Ideas

(2 Before): Suggestion 2 eliminated the wire brushing of the gas flux joints on the muffler ball assembly.

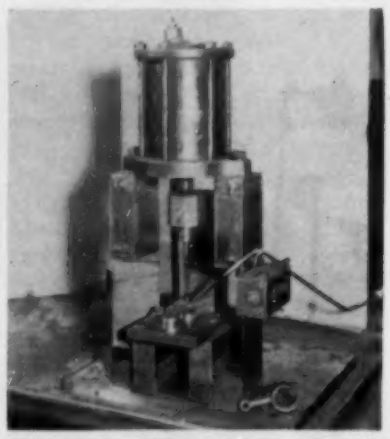
(3 Before): Taping operation used for holding the thermostat in place on commercial systems.



(3 After): Suggestion 3 placed the thermostat in a paper bag for shipment.



(5 Before): Method for broaching of the piston pin hole in the connecting rod by hand-operated press.



(5 After): Suggestion 5 brought about use of an air operated press.

(6 Before): This operation was performed on a drill press.

(6 After): Reseating was combined with another operation on a Trunnion type machine as a result of Suggestion 6.

DETROIT—While there is a great variety of approaches to the matter of cost reduction in production operations, it would be difficult to convince the production executives of the Kelvinator Div. of American Motors Corp. that there is any method more effective than the "Cost Reduction Committee" which it has had in operation for the past couple of years.

Cost reductions realized through the work of this committee have brought about phenomenal savings, relates William Poupard, works manager of the Kelvinator Div. Detroit plant. For example, the first year's activity of the committee brought about a 5% overall reduction in the total end-product cost, probably the greatest part of this in direct labor cost.

The cost reduction committee consists of 12 men—a mixture from plant, office, comptroller, and traffic departments. It meets once a week, every week, in a 2-hour morning session.

Half of the personnel is changed July 1, and again on Jan. 1. The committee chairmanship changes hands once a year.

Committee members are requested not only to submit their own personal ideas on cost reduction, but to gather up ideas from all employes with whom they have contact.

### *No Idea Dismissed Without Committee Action*

Minutes of each meeting are carefully kept, and each cost reduction idea gets a number and is placed in the permanent minutes, and never removed until it has been acted upon or officially dismissed by the committee.

When a cost reduction project is put into effect, careful records are kept, before-and-after photographs are taken of the project, and all of this is entered into a permanent record book.

### *Some Suggestions That Helped Cut Costs*

Following are some of the suggestions that were successfully incorporated into the production or materials handling operations, and a summation of the savings realized. The numbers also correspond to the illustrations of the various examples:

(1) Elimination of a washer and the introduction of a nylock type screw involved no tooling cost, and resulted in a savings of 2⅓ cents per unit.

(2) Elimination of the wire brushing of the gas flux joints on the muffler ball assembly did not involve any tooling cost, and resulted in a saving of 8 cents per unit.

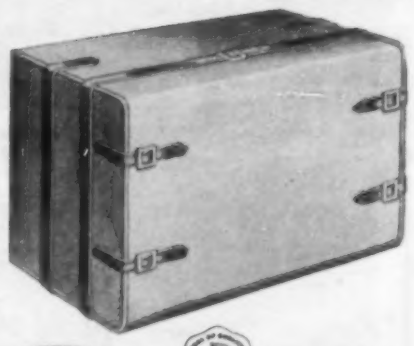
*(Concluded on next page)*

(7 Before): The firm received small castings in bulk form as shown here.



(7 After): Dealing with material handling, Suggestion 7 caused introduction of a collapsible palletized container.

STOP SERVICE WORRIES...
with
Proven KMP
MOISTURE MAGNET
PROVEN... trouble-free operation
PROVEN... to do the job rated
★ One-piece spun copper shell . . . attractive, leak-proof construction.
★ Extra large capacity monel screens . . . for trapping foreign matter and sludge.
★ Pa 400 Silica Gel . . . finest desiccant known. Greater drying capacity . . . non-dusting . . . high reserve capacity.
★ Low pressure drop.
★ 100% acid removal.
★ Easy to install . . . flare fitting with nuts and bonnets . . . solder connection in EXCLUSIVE moisture-proof aluminum packaging.
U. S. Patents Re. 22,465 and 2,430,692
THE ORIGINAL EQUIPMENT DRYER USED BY OVER 75% OF THE WORLD'S LEADING REFRIGERATION AND AIR-CONDITIONING MANUFACTURERS
KMP
KENMORE MACHINE PRODUCTS, INC.
LYONS, NEW YORK
Dryers • Accumulators • Accumulator Dryers • Strainers • Capillary Assemblies
KMP MOISTURE MAGNETS ARE BETTER — COST LESS




*Make Extra Dollars*

ON YOUR AIR CONDITIONER SALES

SELL BOGENE'S CUSTOM FIT

AIR CONDITIONER COVERS

Your customers want to protect their investments. Get your share of this profitable and waiting market.

**Features:**

- Only 5 Custom sizes to fit all standard models.
- Our Pre-tested selling assortment permits you to buy with confidence on assorted size basis.
- Sizes may be exchanged at any time, eliminating inventory problems.
- Made of Specially Formulated 12 gauge General Vinyl.
- Guaranteed pliable at 20 below zero F.
- Heat Sealed and reinforced for long wear.
- Guaranteed by Good Housekeeping and S P I Seals of Approval.

*Bogene offers these nationally-advertised trademarks which your customers recognize and accept.*

COMPLETE PROMOTIONAL MATERIAL AVAILABLE.

JOBBER INQUIRIES INVITED.

BOGENE, Inc. 286 FIFTH AVE. N.Y. 1, N.Y.

WHOLESALE ONLY

We sell YOU . . . NOT your customers!

LEARN about our wholesale-buyers Protection Plan

ORDER from the latest Dependabook . . . No. 164

SAVE because of our low, low prices

● Write for HARRY ALTER'S Dependabook No. 164. It's **FREE!** Illustrates, prices and describes over 10,000 items.

*Write TODAY on your letterhead to*

The HARRY ALTER CO., INC., 1717 S. Wabash Ave., Dept. A, Chicago 16, Ill.

*or visit branches* 33e Lafayette St. New York 13, N. Y. — 122 Parkhouse St. Dallas 7, Texas — Bldg. B, Unit B, 670 Stewart Ave., S.W. Atlanta 10, Ga.

*For more information about products advertised on this page use Information Center, page 34.*

# Cost Reduction Committee--

(8 Before): Compressors were bolted to the pallet under the old system.

(8 After): Suggestion 8 eliminated bolting by utilizing wood blocks nailed to the pallet.

(9 After): Packaging commercial systems in shipping containers was redesigned following Suggestion 9.

(10 Before): Lapping operation was performed on the surface of the valve plate prior to change.

(10 After): Lapping operation was eliminated due to Suggestion 10. The operation is now done in a drill press, lapping the seats only.

*(Concluded from preceding page)*

(3) Thermostats for commercial systems had been taped on before shipment. By eliminating this taping on operation and placing the thermostat in a paper bag, a savings of 14½ cents per unit was realized.

(4) Redesign of the muffler ball assembly was done for reasons other than cost reduction solely, and with a tooling cost of $20,000, savings of 13 cents per unit were realized.

(5) A method change for the broaching of the piston pin hole in the connecting rod made use of an air-operated press, instead of a hand-operated press. At a tooling cost of $120, savings per unit of ¾ cents were realized.

### *Operation Eliminated; 5⅓ Cents Saved*

(6) A suggestion offered the committee eliminated an operation performed on a drill press and combined the reseating with another operation performed on a Trunnion type machine. There was no tooling cost involved, and savings per unit amounted to 5⅓ cents.

(7) In a materials handling problem, where formerly small castings were dumped loose in a truck, a collapsible palletized container was substituted resulting in an annual saving of $7,500. This suggestion also set off a "chain reaction" in other materials handling.

(8) Bolting of compressors to pallets for shipment was eliminated through the utilization of wood blocks nailed to the pallet. No tooling cost was necessary, and savings per unit of 8½ cents were realized.

### *Redesigning Shipping Container Saves 8 Cents*

(9) A redesign of the shipping container used for packaging commercial refrigeration systems involved a $250 tooling with a saving of 80 cents each.

(10) Elimination of a lapping operation on the surface of the valve plate, the operation now being performed in a drill press lapping the seats only, brought about a savings of 2 cents per unit with no tooling cost.

(11) Replacement of a brass cap with a plastic sealing cap on a commercial compressor involved no tooling cost, and savings of 5⅓ cents a unit.

(12) Where condensers were formerly received in individual boxes, by palletizing it was possible to effect a cost reduction in the price of the item.

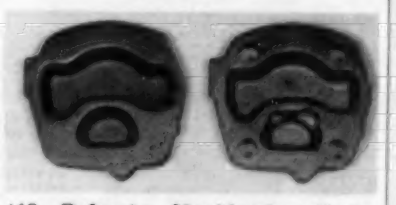
(13) Elimination of a machining operation on the cylinder head by having the reed reliefs cast in the casing rather than machined in resulted in savings of 4⅓ cents per unit with tooling costs of $670.

(11 Before): A brass cap like this was formerly used to seal a commercial compressor.

(11 After): A plastic sealing cap is now used for this operation as a result of Suggestion 11.

(12 Before): Kelvinator formerly received materials in individual boxes as indicated here.

(12 After): By palletizing due to Suggestion 12, a cost reduction in the purchased price of items was achieved.



(13 Before): Machined cylinder heads as done previously.

(13 After): Suggestion 13 eliminated machining by having the reed reliefs cast in the casting rather than machined in.

NEW sound-proof, air conditioned drafting room is a product design improvement which highlights physical expansion of Refrigeration Engineering, Inc.

# More Drafting, Warehousing, Shipping Space Highlights Recold Expansion

LOS ANGELES — Increased production and development of a program for the improvement of all units have resulted from the tremendous physical expansion of about 20,000 sq. ft. which Refrigeration Engineering, Inc. of Los Angeles has undergone during the past year.

Enlarged drafting, warehousing, and shipping facilities highlight the physical growth of Refrigeration Engineering, Inc. which manufactures and markets air conditioning and refrigeration equipment internationally under the "Recold" trade-mark.

By expanding the quarters for draftsmen, Refrigeration Engineering, Inc. has been able to further develop its product design and improvement program. Enlarged facilities for warehousing and shipping has expedited distribution and also stepped up production as space formerly occupied by the warehouse and shipping division has been taken over by the factory.

The enlargement of the company's drafting department consolidated all of Refrigeration Engineering's drafting facilities, except the tool design division which maintains separate quarters. Accommodating 17 draftsmen who handle product design and sales order engineering the new drafting facilities of 900 sq. ft. are air conditioned and soundproof. A new file and print room, consisting of about 250 sq. ft., which is connected to the drafting room, has also been added to the department.

All of Refrigeration Engineering's shipping and warehousing have been moved to the new warehouse located at the rear of the company's present plant. Occupying 109 by 172 ft., the warehouse is constructed of pre-cast concrete walls.


ATTENTION . . . OEM & WHOLESALERS —

DRYERS – STRAINERS – ACCUMULATORS

- ✓ in all spun copper
- ✓ with SAE flare and solder connections
- ✓ custom made to specifications
- ✓ designed for top efficiency, maximum protection of all refrigeration systems
- ✓ specialty items also stocked

Write Today for Catalog & Price Data

WABASH CORPORATION 2300 SOUTH WESTERN AVE. CHICAGO 8, ILLINOIS

Today's gauge for today's job on those Freon systems. Highly accurate and built down to the last detail to *stay* accurate.

The corresponding temperature scales are in color. Note the wide ranges of sizes and readings in F-12 and F-22 types.

Here is the gauge for permanent installation on refrigeration systems . . . with the Marsh "Recalibrator" to keep it permanently accurate. Write for facts or **See Your Jobber**

**MARSH INSTRUMENT CO.** Sales Affiliate of Jas. P. Marsh Corp.
Dept. D, Skokie, Ill. • Marsh Instr. & Valve Co. (Can.) Ltd.
8407 103rd Street, Edmonton, Alberta, Canada

**Wide Range of Sizes and Pressures**

- Dial sizes: 2½", 3½" and 4½" for Freon-12 or Freon-22. Dial size, 2½" only for gauges with both Freon-12 and Freon-22 scales.
- Dial range for pressure gauges: 0-300 lbs. and 0-400 lbs. For compound gauges, 30" x 150 lbs., 30" x 300 lbs., 30" x 400 lbs.
- All gauges have "Recalibrator." All except 3½" and 4½" gauges standard with ⅛" male bottom connection and restriction screw in socket. 3½" and 4½" gauge have ¼" M.P.T. connection.

MARSH Refrigeration Instruments

GAUGES • WATER REGULATING VALVES • SOLENOID VALVES • HEATING SPECIALTIES

AIR CONDITIONING & REFRIGERATION NEWS

# REPRINTS

The following articles have appeared recently in Air Conditioning & Refrigeration News, and are now available in reprint form. Supply of some reprints is limited. The order coupon below can also be used to obtain "selected" reprints not listed by giving title, page, and issue date.

BOOKLET FORM

**A) "AIR CONDITIONING THE HOME"**

A comprehensive study on year 'round residential air conditioning—seven sections including, why people buy it, market conditions, how to sell it, estimating costs for various types of installation, FHA requirements, plus much more valuable information. 9" x 12" in size, finely printed and profusely illustrated.

Only $1.00 each.

**B) "COMMERCIAL PACKAGED AIR CONDITIONERS AT WORK"**

70 pages, 9" x 12"—the first comprehensive book covering this important segment of the air conditioning industry. Includes market, survey information, commercial, institutional and industrial applications, and a complete explanation of the fast growing segment of the commercial market—packaged heat pumps.

Only $1.00 each.

**C) "'SHORT, SHORT' COURSE IN AIR CONDITIONING FUNDAMENTALS"**

A brand new booklet just off the press dealing with air conditioning in basic, understandable terms. Five sections, including Air, Moisture; How to distribute air; Trouble-shooting air; Ventilation, Filtration; Sound, Comfort.

Only 25¢ each.

**D) "PRODUCT KNOWLEDGE, PROTECTIVE MAINTENANCE, TROUBLE-SHOOTING, ADJUSTMENT, REPAIR OF ELECTRIC MOTORS"**

A discussion by T. N. Schierioh, service technical manager of General Motors' Delco Products Div., on servicing refrigeration and air conditioning motors.

Only 40¢ each.

**E) "COMPARISON OF REFRIGERANTS 12-22"**

Paul Reed presents a complete digest and factual comparison of the two refrigerants 12 and 22. Twelve fact-filled pages to help prevent troubles that have been and are now being experienced in the field.

Only 75¢ each; 50 or more copies, 50¢ each.

Everyone concerned with air conditioning should read the above books and keep them handy for reference purposes. Order your copies now.

PAMPHLET FORM

1) Humidity Control In Home Cooling
2) Distributor Tells How He Got Dealers to Sell Heat Pumps—Right Now
3) Experts Eye Home Air Conditioning
4) Packaged Units Chosen for Converting Warehouse to Office Building
5) Proper Refrigeration Zone Use Adds to Food Life
6) News Survey Shows Trends In Residential Air Conditioning
7) Psychological Study Shows Hidden Benefits of Home Conditioning
8) How Ceiling Diffusers Can Be Used In Residential Systems
9) '55 Home Unit Sales Up 34% In N. Y. Area
10) Chilled Water Central Air Conditioning Installed for $1,000-$1,400; Utilizes Wet Heating System, Needs No Duct
11) Detroit Air Conditioning Sales at New High
12) Survey Shows Equipment In Food Stores
13) Survey Points Up Replacement Market for Restaurant Refrigeration Equipment
14) New Minneapolis Survey Shows Home Installations 270% Higher Than '54
15) How to Convince Home Buyer Air Conditioning Adds More Value Than Cost of Equipment
16) Minneapolis Residential Air Conditioning In 1954
18) Residential Air Conditioning In Wichita
19) Residential Air Conditioning In Wilmington, 1954
23) Detroit Commercial Refrigeration Sales
25) Fort Worth Survey Reveals New High In Home Air Conditioning Installations
26) Memphis Residential Air Conditioning In 1955
27) What's the Market for Systems 100 Tons and Up?
28) Detroit Air Conditioning Sales
29) Atlanta Residential Air Conditioning In 1955
30) Balancing Air Distribution for Year-Round Conditioning
31) Heat Pump Prospects
32) Air Conditioning Conference Spotlights the Air-Cooled Condenser
33) Trends in Home Air Conditioning 1956-1965
34) Tips on Blower Installations
35) Builder Called 'Prime Medium' In Home Conditioning Sales

(Quantity rates—100 or more copies—available upon request.)
Single copies, 20¢ each.

Air Conditioning & Refrigeration News
450 W. Fort St., Detroit, Mich.

Please send me the following reprints (circle corresponding letter or number which precedes listing above):

| Quantity | | | | | | |
|---|---|---|---|---|---|---|
| A..... 1..... | 7..... | 13..... | 19..... | 25..... | 31..... | |
| B..... 2..... | 8..... | 14..... | 20..... | 26..... | 32..... | |
| C..... 3..... | 9..... | 15..... | 21..... | 27..... | 33..... | |
| D..... 4..... | 10..... | 16..... | 22..... | 28..... | 34..... | |
| E..... 5..... | 11..... | 17..... | 23..... | 29..... | 35..... | |
| F..... 6..... | 12..... | 18..... | 24..... | 30..... | 36..... | |

.....

Other articles to be reprinted, but not listed above.

☐ Bill me ☐ Bill my company ☐ Payment enclosed

Name

Company

Address

City Zone State

Reprints sent post-paid if payment enclosed.
(In Continental U. S. and Canada only) 10-1-56

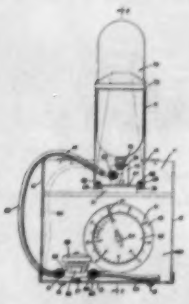
**Heat Pump Service Series Crowded Out**

*"Servicing Weathertron Heat Pumps" has been crowded out of this issue by the abundance of "Advanced Manufacturing" stories. This series will resume in the Oct. 8 issue of the NEWS.*

# PATENTS

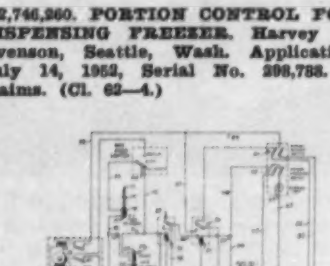
## Week of May 22

**2,746,258. REFRIGERANT CHARGING AND WEIGHING DEVICE. Kenneth W. Hagans, Alliance, Ohio. Application Nov. 23, 1953, Serial No. 393,548. 10 Claims. (Cl. 62—1.)**



1. A fluid charging and weighing device comprising a case, a scale located in the case and including a vertically movable platform, a dial, a pointer cooperating with the dial and operatively connected to the platform, spring means urging the platform into an elevated position, means upon the platform for supporting a refrigerant fluid bottle and the like having an outlet neck in inverted position, a charging valve rigidly mounted within the case, a flexible hose connected to the inlet side of the valve and having means for connection to the outlet neck of the bottle, means for supporting said hose between the valve and the bottle for preventing fluctuation of the pointer, and a second flexible hose having means for connection to the outlet side of the valve and to a unit to be serviced.

**2,746,260. PORTION CONTROL FOR DISPENSING FREEZER. Harvey P. Swenson, Seattle, Wash. Application July 14, 1952, Serial No. 298,783. 5 Claims. (Cl. 62—4.)**



1. In a portion controlled dispensing freezer, a freezing cylinder adapted to freeze mix supplied thereto, means including a motor-driven dasher for dispensing frozen mix from the freezing cylinder, an automatically resetting electric timer activated by the closing of a self-opening manually closed switch, and control means including an electric control circuit opened and closed by the timer for activating the dispensing means, said timer being arranged and adapted to automatically close the control circuit when activated and to thereafter open the control circuit and thereby inactivate the dispensing means after the passage of a predetermined length of dispensing time, means being provided permitting said dispensing operation including an energizing of the motor which drives the dasher to be performed at will.

*(To Be Continued)*


**CHIEF REFRIGERATION ENGINEER**

Unusual opportunity for a well grounded man who wants and can take responsibilities.

**SALARY OPEN**

Location New York City—Our organization knows of this ad. Write in confidence to Box 1000, Roiservice Advtg. Agency, 110 West 34 St., N.Y.C.



**STAND-OUT**

OPPORTUNITY to profit with ONE PRICED

**INTERNATIONAL AIR CONDITIONER COVERS**

made of Firestone Velon

22 STYLES TO FIT EVERY LEADING MAKE FROM ½ to 2 ton units 1951 to 1956 MODELS

Wherever an air conditioner stands out, there is an opportunity for you to sell a cover. Profit with the FIRST, THE FINEST . . . INTERNATIONAL COVERS . . . ALL AT ONE LOW PRICE. Made of long lasting, heavier gauge Firestone Velon. Write for the facts today!

INTERNATIONAL COVERS FOR AIR CONDITIONERS CORP.
532 Broadway, New York 12, New York


# CLASSIFIED ADVERTISING

RATES for "Positions Wanted" $7.50 per insertion. Limit 50 words. 15¢ per word over 50.

RATES for all other classifications $10.00 per insertion. Limit 50 words. 20¢ per word over 50.

ADVERTISEMENTS set in usual classified style. Box addresses count as five words, other address by actual word count. Please send payment with order.

## POSITIONS WANTED

SALES REPRESENTATIVE available, age 34, engineering background, 9 years' experience in engineering and sales in the air conditioning field. Experience includes establishing and promoting volume distribution of various air conditioning products. Proven sales record. Located in Baltimore, Maryland. BOX A5639, Air Conditioning & Refrigeration News.

HERMETIC UNIT specialist: 36 years old, married, willing to travel. Owned and operated hermetic unit rebuilding plant for 10 years. Plus 8 years of field experience. Good knowledge of all types of relays and electrical mechanisms. Experienced in supervisory positions. Can furnish good references. Licensed and bonded. Seeking position as service supervisor, field engineer or trouble shooter with reliable manufacturer or distributor. BOX A5643, Air Conditioning & Refrigeration News.

## POSITIONS AVAILABLE

WHOLESALE REFRIGERATION company has openings for several countermen. Refrigeration or air conditioning knowledge desirable but not essential. Counter sales experience an asset. Positions permanent for right men. Personnel Department, AUTHORIZED SUPPLY CORP., 1437 So. Los Angeles Street, Los Angeles 15, California.

FIELD SALES manager: A challenging position in dealer development work in engineering and sales with West's largest Carrier distributor. Applicants must have broad experience in engineering, contracting, and/or factory sales of air conditioning packages. Knowledge of Carrier line definitely a consideration. Please send complete resume with photograph and earnings expectation in first letter. THE PRENTISS CORPORATION, 631 South Anderson Street, Los Angeles 23, California.

MANUFACTURERS REPRESENTATIVES in all territories for a new air conditioning program just being introduced. If you have the ability to handle a real profit making activity, write giving territory, lines carried and air conditioning experience. M. A. Myers, RAYMOND ROSEN EQUIPMENT CO., 51st & Parkside Ave., Philadelphia 31, Pa.

MANUFACTURER'S REPRESENTATIVE to sell special items of commercial refrigeration, which will be fill in items for established dealers. Territory, New York, Pennsylvania, Midwestern or Southwestern states. THE C. SCHMIDT COMPANY, 1712 John Street, Cincinnati 14, Ohio.

JUNIOR ENGINEER—Air conditioning design and layout prominent Los Angeles contractor. Good salary plus heavy overtime. Free sickness, hospital and accident benefits. Profit-sharing plan. Give complete resume, experience, salary, etc. first letter. Interview arranged. Reply to BOX A5631, Air Conditioning & Refrigeration News.

WANTED: EXPERIENCED, commercial refrigeration servicemen in Detroit area. Only experienced need apply. Top scale. Replies held in confidence. State age and experience. BOX A5634, Air Conditioning & Refrigeration News.

AIR CONDITIONING and refrigeration equipment wholesaler (Southern California) has opening for experienced application and sales engineer. Financial interest available for man capable of managing this fast growing leader in the field. Give complete background data in your first letter. Confidence respected. BOX A5641, Air Conditioning & Refrigeration News.

CONTROL VALVE sales engineer. Opportunity for alert young man to join small, growing company building refrigeration control valves. Prefer graduate engineer or refrigeration experience plus sales background. Operate from Illinois home office. Salary plus incentive. Give complete resume in first letter. Strict confidence for replies. BOX A5647, Air Conditioning & Refrigeration News.

## EQUIPMENT FOR SALE

THOUSANDS OF air conditioners are now equipped with Kesco automatic condensate water disposal pumps available at your local wholesalers in 10 and 20 foot heads 110 or 220 volts only 9" high, water inlet 5 inches from floor. Wholesalers write to KESCO PRODUCTS, P. O. Box 84, Springfield Gardens 13, New York.

## MISCELLANEOUS

"SEALED UNIT Rebuilding-Basic Tools & Methods"—an instructive copyrighted manual giving complete details on economically equipping your shop to handle hermetic rebuilding. Exclusive trade secrets unavailable elsewhere. Mail postcard for descriptive folder. H. W. CUSTER, P. O. Box 98, Center Line, Michigan.

ATTENTION SERVICEMEN: Send for free circulars and bulletins on refrigeration parts and equipment. Real money saving values: WALTER W. STARR; 2833 Lincoln Avenue, Chicago 13, Illinois.



*For more information about products advertised on this page use Information Center, page 34.*

# Some Industry Innovations In 'Human Engineering'

*Incentive Pay*

## Accurate Time Studies, Fairness, Good Administration Make It Work

KENDALLVILLE, Ind.—"An incentive wage plan for hourly rated employes succeeds in stepping up individual worker productivity and raises average wages because it puts the employe into business for himself.

"It has a further benefit to the employer in that it provides him with the one accurate measure of his production costs."

So states J. W. Krall, president, McCray Refrigerator Co., and a vigorous exponent of the idea of incentive wages. Before becoming president of McCray, Krall had been an executive with Tyler Refrigeration Corp., which has had an incentive wage plan in effect for some time. When he took over at McCray, he took immediate steps to put such a plan into effect.

### *Plan Must Be Fair, Intelligently Administered*

"The benefits of an incentive plan won't be realized," Krall points out, "unless the plan is set up on a fair basis, intelligently administered, and properly sold to the workers.

"Time and job element measurements must be established on a fair and equitable basis, with the standard of performance clearly related to the individual worker's normal effort and output.

"Any time the worker produces above the standard of performance, he earns more than the standard rate, with no ceilings on his possible earnings, regulated only by good workmanship standards, as determined by the inspection department."

Krall says that installation of the incentive wage plan has increased production efficiency (measured in terms of output per worker) as high as 70% in some operations, with an overall increase of nearly 50%. Wages of individual workers have increased as much as 100%, with the average over 25%.

"Competent and continuing time studies of the various production operations involving workers who are on an incentive wage plan is a 'must' to the success of the plan," McCray's president asserts.

"The time study man must understand each operation thoroughly, and he must also be a pretty good judge of human nature, for there is a natural tendency of the worker to make the particular operation a little more complicated and slower than usual, when he is being timed for a standard of performance.

### *Timing for Job Must Be Done with Skill*

"The time study man must be able to recognize any such deviations from normal activity on a job, and be firm in his refusal to time the operation until it is properly done.

"When management gets a complaint that the rate on a particular production operation isn't right, it should have a new time study made immediately by a time study man who has no previous data on the particular operation. If the complaint about the rate still continues, it is sometimes a good idea to let the worker time himself on the job.

"One all-important factor in the management of a wage incentive plan is to make certain that all employes make the base standard of performance. If there is any individual who can't make it on a particular operation, he should be transferred to some other, and if he can't make it on any operation, he should be discharged.

"In any incentive wage plan management must always have the right to adjust rates, because a 'soft rate' or a 'hard rate' may show up on some operations.

"An individual's earnings does not mean that the rate is too soft or too hard. The final determination can only be made by an answer to the question: 'How hard is he working to earn what he is being paid under the incentive plan?'

In the McCray production setup, all departments are on the incentive plan. Assembly operations for commercial refrigerator equipment are not so complicated that any one particular worker can't do any job on the line—in fact, they are trained to do any job.

Thus, if a bottleneck develops at any particular station on the assembly line, a worker whose own operation is held up because of the bottleneck, can step in to help break the bottleneck, and still make his standard rate.

### *Down Time Reduced*

"Another benefit for management from the incentive plan is that it reduces 'down time' on the assembly line," Krall relates.

"The workers themselves see to that, because they are paid only the standard rate—or in some cases a percentage of it—for down time. So if there is a breakdown of machinery, or a failure to have sufficient parts provided, the workers are the first to make a noise about it.

"We keep a close analysis of down time on our records—and every minute of it must get the approval of the foreman in the particular department in which it has occurred."

"If your plant is unionized," Krall says, "sell it first to the union stewards, then to a committee of workers, put it into one department at first, and let the plan sell itself by word of mouth. If necessary, explain it before a mass meeting of hourly rated workers—and hold that meeting on company time.

"Quality may seem to suffer at first, but the remedy is to concentrate on quality control in the early stages of the plan, and simply make the worker do over—on his own time—any work that doesn't meet quality standards.

*Executive Development*

## *Multiple Management Produces 2,000 Usable Ideas In 15 Years*

CINCINNATI — The Williamson Co. here uses a plan of executive development known as Multiple Management. Although it is probably unique in the heating and air conditioning industry, the plan is one which is gaining recognition and converts in many other industries.

W. L. McGrath, president of The Williamson Co., credits the system with "being the chief factor in the company's growth to a position as one of the nation's leading manufacturers of residential heating and cooling equipment."

### *Plan Adopted In 1932*

Multiple Management was originated in 1932 by Charles P. McCormick, president of the food products firm of McCormick and Co., Baltimore. Williamson adopted the plan in 1938. It is based on three simple premises:

1—A supervisor can work more intelligently if his knowledge and thinking are not limited merely to his own department, but are broadened to include the company's entire scope of operations;

2—The Company will benefit from this greater knowledge and broader thinking by producing a better product;

3—Group discussion is the most practical way to impart broader knowledge, stimulate thinking and crystallizing ideas into practical work methods.

### *3 Discussion Groups*

The plan operates through three discussion groups elected from among the supervisory forces. These groups are the Junior Board of Directors, the Factory Board of Executives, and the Sales Board.

The Boards conduct their meetings formally on a basis of parliamentary procedure.

The members of the Boards do most of their basic work of investigation and study through the medium of small committees. These committees, in turn, submit their written reports to the regular meetings of their full boards, at which time the reports are discussed and acted upon.

### *Senior Board Gets Recommendations*

When, after discussion, a Board agrees upon a certain course of action to be recommended to the Corporate or Senior Board, a formal resolution to that effect is offered. To become effective, the resolution must be passed by unanimous vote of the subordinate board. When thus passed, the recommendation goes to the Corporate Board of Directors of the company (known as the Senior Board), for acceptance or rejection.

If accepted by the Senior Board, it is then turned over to management to be put into effect. Its application is accomplished through the proper departmental lines of authority, just as would be the case if no multiple management plan were in effect.

### *Selection of 3 Boards*

The Williamson members of the Junior, Factory, and Sales Boards comprise about one-half of the company's total supervisory force. Every six months, elections are held, at which three members of the Junior Board and four of the Factory Board are replaced with new members who must be men who have not served on the Board during the preceding six months.

Members of each Board "rate" their fellow members. These "ratings" serve as a guide to determine, on the basis of performance in Board work, which ones shall be re-elected. To fill the places of those not re-elected, new members are elected from among the supervisory force by those who remain on each Board, who, by observation, estimate the potentialities of the candidates.

### *Management Surrenders None of Its Prerogatives*

"The powers of the Junior Board are limited to that of *recommending* only, and the execution of approved recommendations shall be understood to the prerogative of Management.

"Under no circumstances shall members of the Junior Board concern themselves with the execution of approved recommendations, unless specifically instructed to do so by Management."

The above statements emphasize that the recommendations of the multiple management boards are *recommendations* only, and carry no authority. The authority remains, in the standard conventional manner, with the Senior Board of Directors and its executive management.

Yet, during the 15 years that Multiple Management has been in effect at Williamson, over 2,000 recommendations have been made to the Senior Board of Directors by the three multiple management boards; out of that total 98% have been accepted and put into effect.

The essential point, Williamson officials believe, is that no man, or two men, or 10 men, could possibly have developed all of these suggestions for improving the operation of the company. It was the *multiple* effect of many minds working together in *management* that brought about this result.

A number of Williamson's jobbers and dealers have put the plan to their own use. Even the company's advertising agency adopted the magic formula after seeing how well it worked for their client!

AUTO-LITE
TEMPERATURE RECORDING...
Newly designed, Model "1000" Auto-Lite Recorder gives permanent proof of temperature behavior. • 6" clear reading chart; various standard ranges from minus 40°F. to plus 550°F. • 3 standard types; choice of 24-hr. or 7-day cycle. • Electric or mechanical chart drive. • With capillary tubing for remote reading. Priced from $49.50.
Send for new catalog describing many styles of Auto-Lite temperature Recorders and Indicators.
Model "1000"
THE ELECTRIC AUTO-LITE COMPANY
INSTRUMENT AND GAUGE DIVISION
TOLEDO 1, OHIO
NEW YORK • CHICAGO • SARNIA, ONTARIO
TEMPERATURE RECORDERS

## Rheem Jet Unit--

*(Concluded from Page 1, Col. 5)*

refrigerant vapor inside of a specially contoured ejector tube. Discharge of the jet at supersonic speed accounts for much of its effectiveness."

The prototype of the new central air conditioning unit, on which development work is being completed, was installed for demonstration to the press at the laboratories of Peoples Gas Light & Coke Co.

"This new Rheem approach to air conditioning, using gas for operation, has introduced extensive refinements to the jet principle of cooling, previously useful only in very large commercial or industrial applications," the company said.

The new unit, thus far unnamed by Rheem, consists of a small cabinet 4 ft. long, 2 ft. wide, and 4 ft. high. It may be placed outside of the home.

### Change from Heating to Cooling or Vice Versa Is Automatic

"Installing a warm air heating system with the new Rheem heating and cooling unit is a simple operation, using conventional ductwork," the company said. "The furnace is eliminated, and instead a small cabinet is installed, enclosing a finned coil and a quiet, high-capacity blower.

"Then chilled water is circulated through the coil for summer air conditioning, while the blower dispatches cool dehumidified air throughout the house. During the winter, hot water is pumped through the finned coil, to warm the air stream from the blower.

"In homes with hot water systems small, attractive convector units are situated throughout the homes. Each convector has its own fan to circulate air over a small finned coil, through which chilled—or hot—water is pumped.

"Another aspect of the new Rheem system, for installation in hot water systems, is the ease with which it lends itself to an arrangement the experts call the 'ideal combination.' This combination uses hot water for sustained heat, with warm air for rapid increase in temperature, whenever the weather suddenly becomes much colder."

The company pointed out that "versatile though the new Rheem unit proves to be, its revolutionary operation is based entirely on the use of a single gas burner unit.

"The jet operation through which the cooling is accomplished, however, is not to be confused with jet engines for aircraft. Instead, the newly-developed Rheem air conditioning unit operates in this manner:

"A very small jet discharges refrigerant vapor inside of a specially contoured ejector tube. Discharge of the jet at supersonic speed accounts for much of its effectiveness.

"First, there is a drop of several hundred degrees Fahrenheit in the vapor as it issues from the jet. Second, high speed of the discharge entrains, or draws off, vapor of the refrigerant which is maintained in an evaporator chamber to which the ejector tube is connected.

"As evaporation takes place in the chamber, rapid cooling is the result. This lower temperature, in turn, cools the circulating water that is pumped through a coil of copper pipe in the evaporator chamber.

"Low temperatures are maintained by relieving the ejector tube of pressures that would ordinarily be built up by the jet action. This pressure reduction is accomplished by condensing the vapor in a specially designed unique air-film condenser that has been in use by Rheem for the past three years.

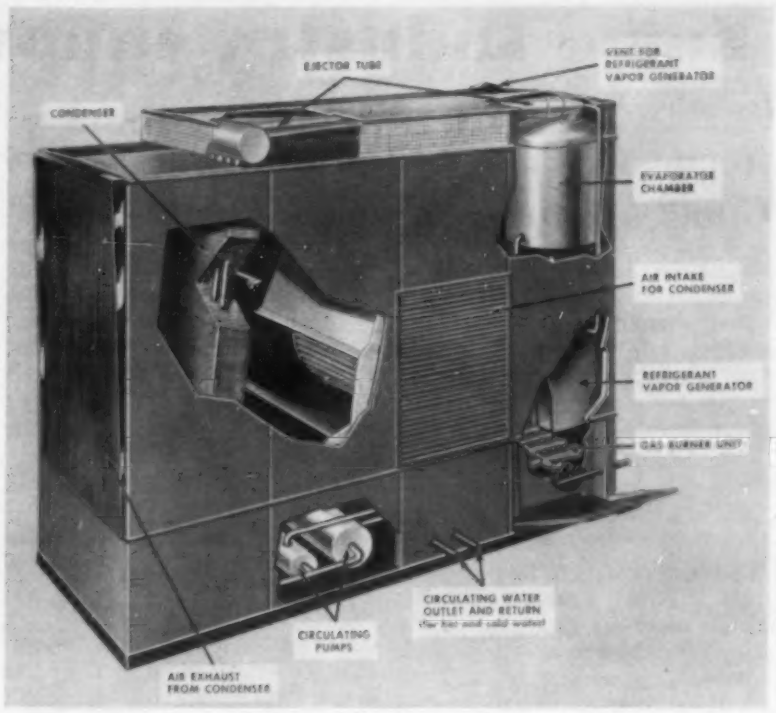
"When controls call on the Rheem unit for heating, however ,the vapor condensing phase of the operation ceases. Then, jet discharge is diverted into the evaporator chamber, heating water that is being circulated in the copper coil, before it goes either to the finned coil in the blower cabinet, or to the hot water heating system.

"The liquid-and-vapor system, that serves to cool or to heat, is a completely sealed operation. Some of the liquid is pumped into a refrigerant vapor generator to supply vapor pressure for the jet operation. Another portion of the liquid is fed into the evaporator chamber; and both operations are regulated by simplified automatic controls.

"Other controls in the sealed system regulate the gas flame under the refrigerant vapor generator by positive, self-actuating automatic valves. Liquid used in the system is non-toxic, non-inflammable, and non-corrosive."

"Rheem engineering has revealed promises of no operating troubles and little or no service problem in connection with the new gas-operated unit," the company said. "As a practical manufacturer of home equipment, however, Rheem has worked out a year-long field test program."

Thus, the new unit will not be marketed before 1958.

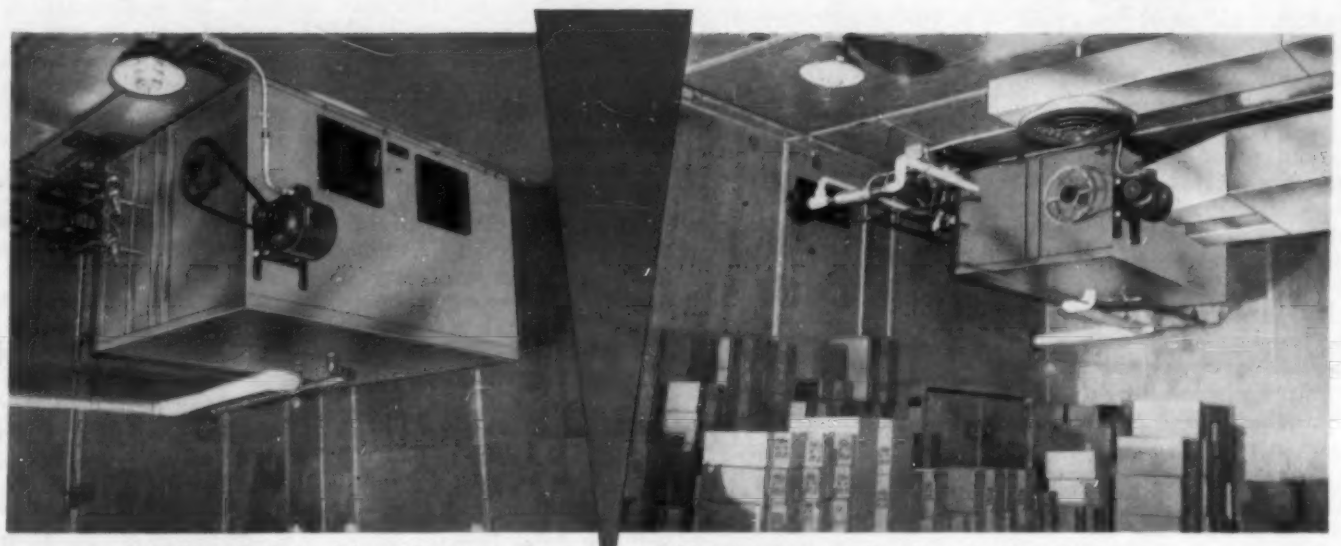



CUTAWAY view showing working parts of the new Rheem jet gas-fired year-round air conditioning unit.


# RAPID...

## Complete Defrosting With Glycol

## in



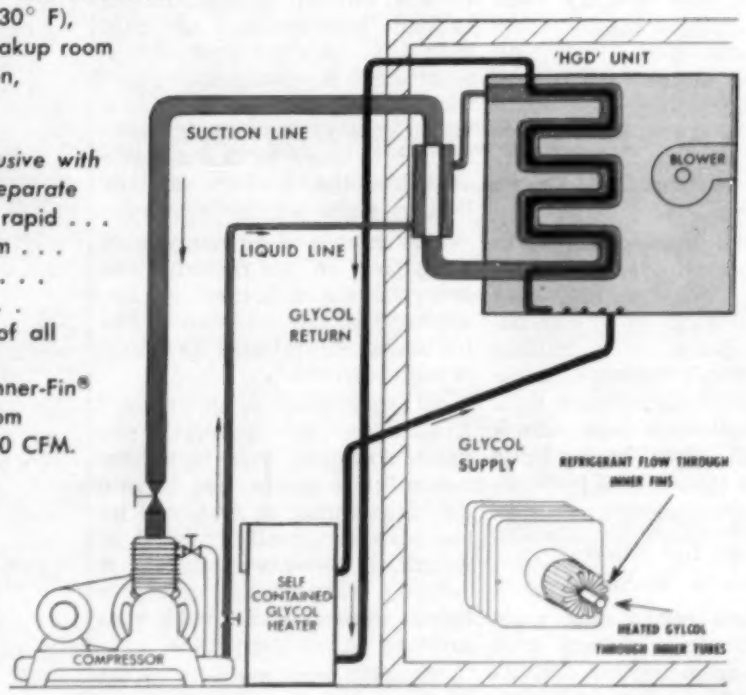
Levitz Frozen Foods, Inc., Lebanon, Penna.

Refrigeration Contractor: Herre Bros., Harrisburg, Penna.
Consulting Engineers: V. C. Patterson & Associates, York, Penna.

## Dunham-Bush Heavy Duty Product Coolers

Dunham-Bush 'GD' Glycol Defrost product coolers in the sharp freeze room (maintained at minus 30° F), meat storage room (minus 10° F) and breakup room (0° F) at Levitz Frozen Foods, Inc., Lebanon, Pennsylvania, require defrosting for only *30 minutes once a day.*
Inner-Fin® construction of these units, *exclusive with Dunham-Bush,* makes possible an *entirely separate* defrost circuit (see diagram). Defrosting is rapid . . . room temperature rise is held to a minimum . . . no dilution of defrost medium is possible . . . system has "separate-circuit" reliability . . . power economies are marked. Defrosting of all units is automatically controlled.
'GD' units, featuring all copper patented Inner-Fin® construction, are available in capacities from 22,000 to 136,000 BTU/hr., 4,800 to 18,300 CFM.

Request free catalog containing complete information on these and other units in the extensive Dunham-Bush line of *quality* low temperature equipment.




DUNHAM-BUSH

**Dunham-Bush, Inc.**

WEST HARTFORD 10 • CONNECTICUT • U. S. A.

AIR CONDITIONING, REFRIGERATION, HEATING PRODUCTS AND ACCESSORIES




*For more information about products advertised on this page use Information Center, page 34.*